Vol. 7, No. 5 November, 1952

The Relation of People to Natural Resources
. . . J. S. Russell

Advances in Soil Conservation in Canada
. . . E. S. Hopkins

A Social Phase to the Conservation Task
. . . Paul A. Miller

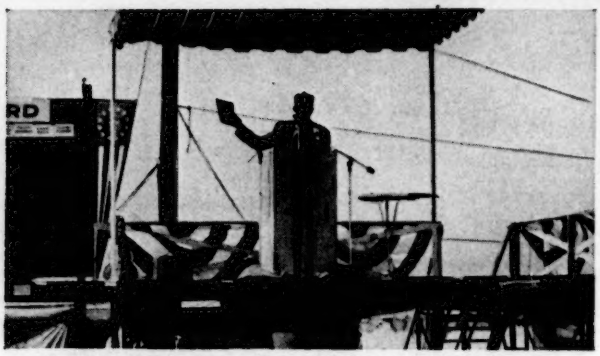
Progress in the Little Sioux Watershed Flood Control Program
. . . R. H. Musser

Wildlife and the Business of Farming
. . . Durward L. Allen

there's a **JOB** to be done

Here's How They Did it!

at KASSON



Morris Fonda, President of the Soil Conservation Society of America, welcomed the crowd over the public address system and didn't forget to put in a plug for "Down the River."

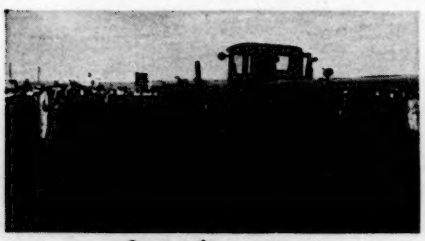
The weather, both days, was clear and cool, but 1100 is a lot of acres and the touring wagons never lacked customers.

Politics was on everyone's tongue at the National and Minnesota Soil Conservation Day and Plowing Matches at Kasson on September 5 and 6. After all, it's not every year that you can look at, as well as listen to, both presidential candidates on the same day.

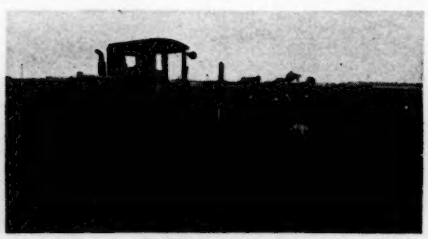
But this added attraction for 1952 was not permitted to interfere with the regular schedule of events. The crowd of over 100,000 came to see state and national plowing matches of both level land and contour varieties PLUS a demonstration of soil and water conservation in many of its most important phases—and see it they did—on foot and horseback, from the air, and especially by hitching rides on the dozens of flat-bed wagons pulled by farm tractors which toured the 1100 acres of the six participating farms, stopping at many points on the route to hear technicians explain exactly what was going on.

There's a job to be done, and it won't be finished until urban people as well as rural people understand what total Conservation and proper Land Use is all about and what it means to each of us. What the tens of thousands saw at Kasson is a definite and important step in that direction.

Austin-Western Power Graders Made Themselves Generally Useful



Constructing terraces



Building waterways

Cutting emergency driveways

AUSTIN-WESTERN COMPANY Subsidiary of Baldwin-Lima-Hamilton Corporation AURORA, ILLINOIS, U.S.A.

Austin Western

BALDWIN BLH LIMA HAMILTON

SINCE 1859 BUILDERS OF CONSTRUCTION EQUIPMENT

Free-Swing *Implements*

follow the contour

New 2-furrow, 2-way A-C Spinner plow eliminates the dead furrow and plows all furrows uphill. Preserves the drainage pattern of the field.

Tractor-mounted subsoiler opens up tight subsoils on pastures and crop lands . . . increases moisture-holding capacity and eases the load on terraces. In lowlands it often helps drainage.

When farmers consider a change from straight rows to contours, they want to know how power machinery fits into the new pattern. The answer may decide for or against a conservation plan.

New Allis-Chalmers hydraulic implements have an easy-steering "feel." They follow where the tractor leads — around curves, over uneven ground, along terraces.

The single master hitch-point ahead of the rear axle on CA and WD Tractors leaves implements free to swing right or left for steering around contours and dodging stones. When plowing, for example, there is no crowding or side draft; no skidding of the plow.

FREE-SWING implements are the answer to faster, easier farming on contours and level land alike. Any Allis-Chalmers dealer will be glad to supply full information.

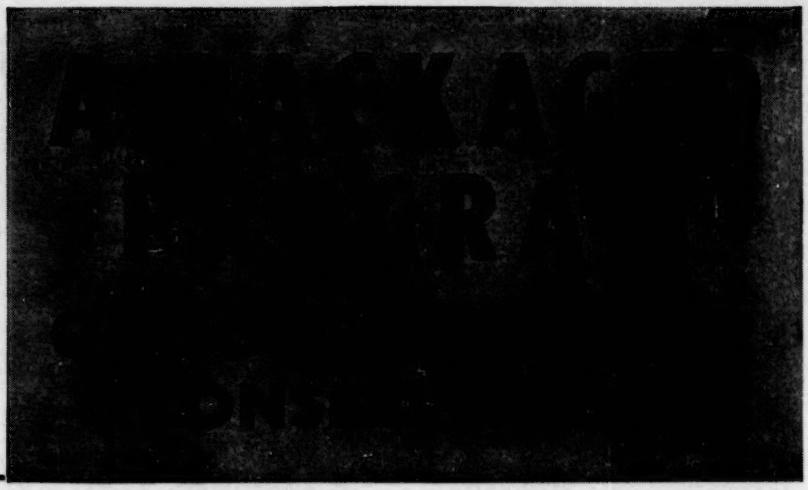
ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Free . . . to

INSTRUCTORS

CLUB LEADERS

FARM ADVISORS



8 MOVIES

. . . 16 mm. in full color and sound. "Soil and Life" tells the whys and hows of conservation. "Strips and Curves"— erosion control on the Great Plains. Other titles: "Water Spreading," "Modern Farm Machines Bring Back the Range," "Broad Base Terracing," "Build Good Terraces," "Level Farming on Sloping Fields," "Building a Pond."

8 BOOKLETS

. . . written as companion pieces to the above films, clinch what the films teach. Your choice of materials for semi-humid and semi-arid conditions. Be sure to request enough booklets so that each member of your audience may take one home for further study and future reference. Booklets and films have identical or similar titles.

7 POSTERS

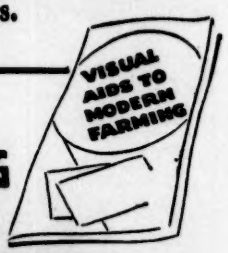
. . . 24 x 36 inches, are designed for impact at classroom distances and to supplement films and booklets. All material in this series is soundly practical, showing how to use ordinary farm tractors, plows, and scrapers. Here is information the farmer can take home and put to work saving soil and making dollars.

SLIDE FILM

. . . "More Benefits from Manure" and companion booklet show how to make best use of barnyard manure, one of America's most valuable farm crops. Most Case materials are purely educational; some include promotional matter. All films are loaned and printed matter is furnished without charge to instructors, club leaders, county agents, and other responsible persons, groups, and organizations.

Here is flexible material for a fact-packed class hour or a full evening's club program, as you will. Read at right how to order.

CASE



60 TEACHING AIDS . . .

NOW OFFERED

BE SURE YOU HAVE THE NEW VISUAL AIDS CATALOG

As its contribution to a prosperous, enduring agriculture, the Case Company has prepared some sixty educational items. The new Visual Aids catalog describes each and tells how to order. Get your copy, and schedule your choice of movies, etc. through your nearest Case dealer or Branch House. J. I. Case Co., Racine, Wis.

Journal of SOIL AND WATER CONSERVATION

VOLUME 7
NUMBER 5

TO ADVANCE THE SCIENCE AND ART OF GOOD LAND USE

This JOURNAL is the official organ of the Soil Conservation Society of America. It is owned, edited, and published bi-monthly by the Society.

OFFICERS AND COUNCIL
OF THE S.C.S.A.

MORRIS E. FONDA ..... *President*
R. Y. BAILEY ..... *First Vice President*
PAUL C. MCGREW ..... *Second Vice President*
ROGER H. BRAY ..... *Council*
KIRK FOX ..... *Council*
EDWARD H. GRAHAM ..... *Council*
RUSSELL G. HILL ..... *Council*
R. H. MUSSER ..... *Council*
J. K. VESSEY ..... *Council*
ADRIAN C. FOX ..... *Council*
FIRMAN E. BEAR ..... *Council*

Executive Secretary
H. WAYNE PRITCHARD
Suite 1016 Paramount Building,
Des Moines 9, Iowa

Treasurer
J S. RUSSELL
Register Tribune Building 715 Locust
Des Moines, Iowa

PUBLICATION OFFICE: 32nd Street and Elm Avenue, Baltimore 11, Maryland.

NATIONAL HEADQUARTERS AND SECRETARY'S OFFICE: Suite 1016 Paramount Building, Des Moines 9, Iowa.

POST OFFICE ENTRY: Entered as Second-Class matter in the Post Office at Baltimore, Maryland, August 28, 1946, under the Act of March 3, 1879.

MEMBERSHIP: Annual membership is on a calendar year basis and is $5.00 per year for members and $3.00 per year for associate members, of which $1.50 is for subscription to the JOURNAL and 25c for NOTES AND ACTIVITIES. Subscriptions for the JOURNAL to libraries and others is $3.00 per year. Single copies are 75c each.

CORRESPONDENCE—Concerning manuscripts, books for review and other editorial matters should be sent to the Editor, Room 303, Watson Building, Fairmont, West Virginia.

BUSINESS CORRESPONDENCE—Concerning remittances and questions should be sent to the Executive Secretary, Suite 1016 Paramount Building, Des Moines 9, Iowa.

CHANGE OF ADDRESS: Notice of change in address should be received two weeks before the date of issue on which the change is to take effect. Both the old and the new address should be sent to the office of the Secretary.

REPRINTS: Articles appearing in this publication may be reprinted on condition that full credit be given the JOURNAL OF SOIL AND WATER CONSERVATION and the author; also the date of publication.

Contents for November, 1952

Advances in Soil Conservation in Canada
E. S. HOPKINS 209

The Relation of People to Natural Resources
J. S. RUSSELL 215

Coastal Bermuda Grass on Conservation Farms
W. W. HULL 222

Wildlife and The Business of Farming
DURWARD L. ALLEN 223

Pictorial Sections 227

Progress in the Little Sioux Watershed Flood Control Program
R. H. MUSSER 231

A Social Phase to the Conservation Task
PAUL A. MILLER 238

The Story of Two Watersheds
JOHN A. ALLIS 243

BOOK REVIEWS 246

Field Notes and Comments 249

The Cover

Sheep grazing under special use permit in Muddy Meadows, Gifford Pinchot National Forest, Washington, Mount Adams rises majestically in the background. Grazing is one of the recognized uses of the national forests.

—Photo U. S. Forest Service

EDITORIAL OFFICE: ROOM 303 WATSON BUILDING
FAIRMONT, WEST VIRGINIA
WALTER C. GUMBEL, *Editor*

EDITORIAL BOARD

Term Expiring 1952
BEN O. OSBORN, *San Angelo, Texas*
A. D. STOESZ, *Lincoln, Nebraska*
ROGER H. BRAY, *Urbana, Illinois*

Term Expiring 1953
CARL B. BROWN, *Washington, D. C.*
WM. R. VAN DERSAL, *Portland, Oregon*
BERNARD FRANK, *Washington, D. C.*

Term Expiring 1954
EDWARD H. GRAHAM, *Falls Church, Virginia*
BERNHARD A. ROTH, *Upper Darby, Pennsylvania*
E. L. SAUER, *Urbana, Illinois*

IF YOU WANT FACTS!

. . . here are some worth talking about

People often ask if conservation farming pays and, if so, how much?

You can answer an emphatic "yes" to the first part of that question. As to the second part, there's plenty of "how much" evidence.* Take this sample:

> In Illinois they've studied the subject for years. All the farms studied showed a better net income after a good conservation program had been put into effect. Among a group of central Illinois farms, those where the best conservation practices were followed returned, as a 5-year average, $6.65 an acre more than similar farms where good soil management was not applied. On a 160-acre farm this extra net income would total more than $1,000 a year. Farms in other parts of the state showed similar gains from soil conservation practices.

Or take another example—on land that only a few years ago was eroded and worn down, but now has been built up through pasture improvement:

> A good grass-legume mixture produced 435 pounds of meat an acre. With beef or lamb at $28 per hundredweight, that's a gross income of $122 an acre.

A farmer can make money on production like that, and our American farms are full of similar stories—stories worth retelling and worth repeating right out **on the land.**

*All figures from published records.
Reprints of this message available on request.

JOHN DEERE • MOLINE • ILLINOIS

Advances in Soil Conservation in Canada

E. S. HOPKINS

Problems in soil conservation in Canada vary widely with different conditions of soil, climate and types of farming. In Eastern Canada low soil fertility and poor drainage are major problems with soil erosion and flood control important in local areas. In the Prairie Provinces, where about one-third of the improved land is under summerfallow, soil erosion is a serious menace, particularly in dry years.

The Federal Government of Canada has promoted soil conservation particularly through the Prairie Farm Rehabilitation Act and the Maritime Marshland Rehabilitation Act. Provincial Governments have advanced this work through certain controls over submarginal land and new settlement as well as by assistance for drainage, flood control, the use of limestone and farm planning. The Provincial and Federal Governments have cooperated in undertaking soil surveys.

A few agronomic problems relating to soil conservation are mentioned. These included field crop shelterbelts, legumes, grey wooded soils, submarginal land, together with efficient tillage and cropping methods.

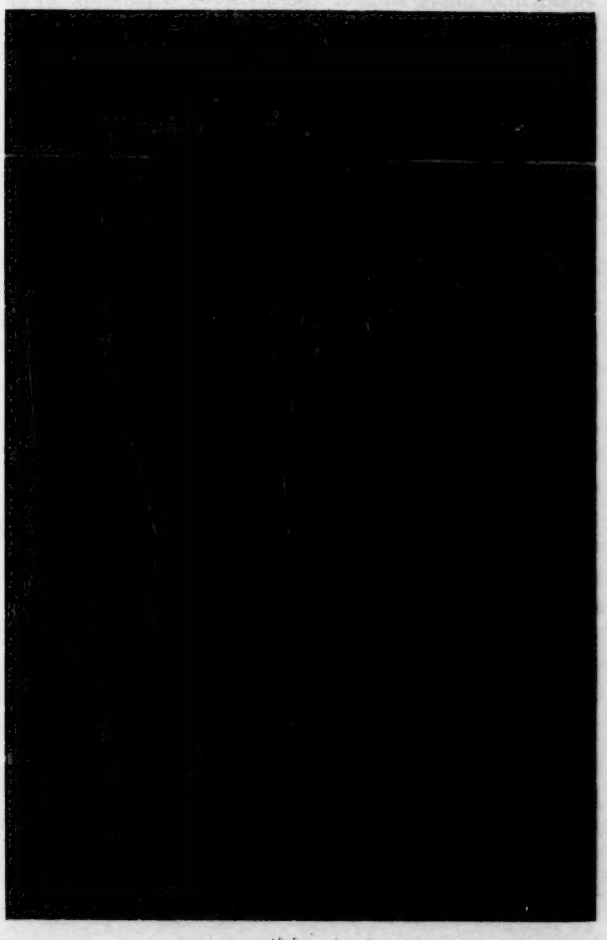
BEFORE DISCUSSING what advances have been made in soil conservation in Canada, it would seem advisable first to try to explain what is meant in this paper by the term "*Soil Conservation.*" While considerable emphasis has been given in recent years to the importance of preventing soil erosion, it is preferable probably to include under this term all the various methods which promote the maintenance and, if possible, the improvement of soil productivity.

This covers, of course, the whole range of practices necessary for good farming, including erosion control, good tillage, suitable crop rotations, the use of manure and fertilizers, maintenance of organic matter, flood control, suitable soil reaction, moisture conservation and the proper drainage and irrigation of the soil where these are required. This topic might include, also, some consideration of government policies in so far as they affect conservation. Reference is made to the more important soil conservation problems in the main agricultural regions of Canada and to a few special agronomic investigations relating to soil conservation. Obviously this is a very broad subject and it is proposed only to outline very briefly the extent to which soil conservation, according to this interpretation, has advanced in Canada.

A General View of Canadian Agriculture

Agriculture is the second largest industry in Canada being exceeded only by manufacturing. Twenty per cent of the total population live on farms. Some provinces are predominately agricultural, like Saskatchewan with 50 per cent of the population on the farm, while

Creeping Rooted Alfalfa. This new strain of alfalfa, being developed by the Experimental Farms Service of Canada, spreads by producing additional shoots from the root system.



Dr. E. S. Hopkins is Director of the Central Experimental Farm with headquarters at Ottawa, Canada. He is also identified with numerous committees on resource conservation. Dr. Hopkins presented this paper at the Annual Meeting of the SCSA held in Buffalo, New York, October 23-25, 1952.

Agriculture in Certain Geographic Regions of Canada (1951)

	Eastern Canada	Prairie Provinces	British Columbia	All Canada
Number of farms—one acre and more	376,363	252,411	30,827	659,601
Acreage of Crops				
Small grains	6,327,442	43,025,380	282,103	49,634,925
Hay	8,064,713	2,177,217	311,243	10,553,173
Other field crops	1,309,832	225,039	17,639	1,552,510
Gardens, orchards and Nursery Crops	369,261	40,754	61,463	471,478
Other improved land	878,629	1,663,038	61,815	2,603,482
Improved pasture	6,523,364	3,138,562	343,195	10,005,121
Unimproved pasture (1941)	7,146,903	43,384,975	1,846,358	52,378,236
Summerfallow	392,105	21,569,634	70,318	22,032,057
Total	31,012,249	115,224,599	2,994,134	149,230,982

others, like British Columbia and Ontario, with ten and fifteen per cent, respectively, on the farm, are primarily industrial.

Agriculturally, Canada may be divided into three geographic regions. Eastern Canada would comprise the six eastern provinces; the Prairie Provinces would include Manitoba, Saskatchewan and Alberta; while the third region would be the mountainous province of British Columbia. Each of these regions might be divided again into many smaller sub-divisions depending upon differences in climate and soil. There is a great difference, also, in the types of agriculture in each of these regions. As many of those in attendance at this meeting may not have had an opportunity to become acquainted with Canadian agriculture, it might not be out of place, perhaps, to include a brief table presenting a few of the more important facts regarding the number of farms and the acreage of the various crops grown in each of these regions.

It will be clear from the above table that by far the greater acreage of land under cultivation is to be found in the Prairie Provinces. Nearly 90 per cent of the grain, practically all of the summerfallow, and 82 per cent of the unimproved pasture or range pasture, are to be found in that region. Hay, improved pasture, and other crops, such as corn, tobacco, vegetables and fruit, are located principally in Eastern Canada and British Columbia. The total gross farm income is not greatly different as between the Prairie Provinces and Eastern Canada.

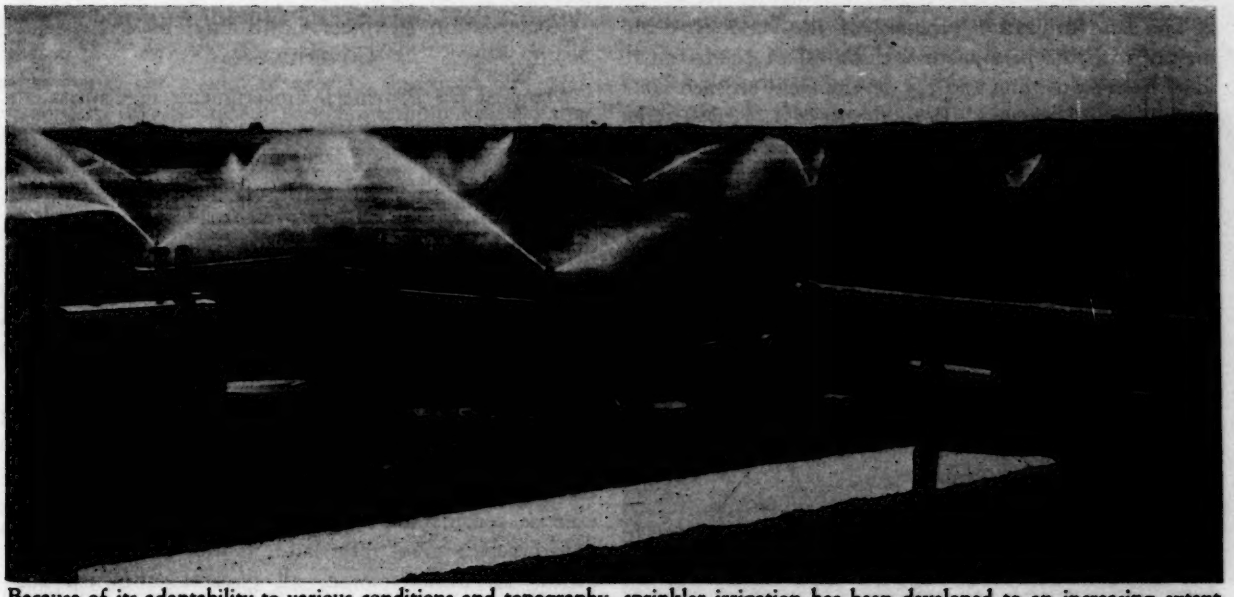
Soil Conservation Problems in Canada

Owing to the extremely wide differences in the soil, climate and types of agriculture, quite different soil conservation problems are encountered throughout Canada. Eastern Canada, with its mixed farming type of agriculture and with 61 per cent of the improved land in hay and pasture, is not as seriously affected by soil erosion as is the Prairie Provinces. Danger from this trouble is limited largely to the relatively small acreages in intertilled crops, although erosion does occur on rolling land seeded to grain crops.

The maintenance of soil fertility is the most important soil conservation problem in Eastern Canada. The prevailing podsolic soils, never very rich even under virgin conditions, must be provided with farm manure and commercial fertilizers if satisfactory crops are to be grown. The Maritime Provinces and Eastern Quebec have acid soils which must be limed for best results with field crops. The principal crops harvested are oats and hay and as the average yields are from about 30 to 35 bushels of oats per acre, and approximately 1.5 tons of hay per acre, there is considerable room for improvement. Land drainage is a very important problem, particularly under the present conditions of high labor costs. Flood control is important only in a few local areas.

Quite different problems are experienced in the Prairie Provinces from those in Eastern Canada. In the first place, it has a much drier climate with about only one-half the total annual precipitation, although fortunately most of this falls during the growing season. There is a greater snowfall in Eastern than in Western Canada, but a considerable proportion of both regions has frozen soil for at least four months of the year, a factor which although effective in controlling erosion has other serious disadvantages.

Nearly one-third of the total improved land in the Prairie Provinces is in summerfallow, a system of cultivation far more susceptible to erosion than any type of cropping, even row crops. Sixty per cent of the area is seeded to spring grain crops, which exposes the land to erosion for a period of time in the spring until there is sufficient growth to cover the soil. Only 7 per cent of the acreage is in seeded hay and pasture. Throughout large regions, there are very few trees to check the force of the winds. For these reasons, soil drifting is a serious and ever present menace, particularly in dry years. During the drought period from 1929 to 1937, soil drifting



Because of its adaptability to various conditions and topography, sprinkler irrigation has been developed to an increasing extent in recent years. Flood irrigation, however, is the most extensively used system of irrigation in Canada.

caused extensive damage. However, if similar conditions again occur, more information is undoubtedly available now to effect some measure of control. Water erosion, although important in some regions, is not as serious a problem as soil drifting. It occurs chiefly on sloping land during heavy rainstorms.

Proper land utilization is another important conservation problem in the Prairie Provinces. Serious trouble has been experienced on poor, light soil in dry regions. Lack of soil fertility is not a problem at all in the brown soil zone, there is a slight phosphorus deficiency in the dark brown soils, greater phosphorus deficiency in the black soils, while in the grey wooded soil zone special improvement measures are imperative if these soils are to be farmed successfully.

While British Columbia is not comparable in size or in the extent of its agricultural development with either Eastern Canada or the Prairie Provinces, it has such widely different climatic and topographic conditions that it must be discussed separately. Precipitation ranges from less than 10 inches a year in some of the intermountain valleys to over 100 inches along the coast. Elevation rises from sea level up to the snow line in the mountains. Coastal districts enjoy relatively mild winters but it is much colder in the interior valleys. Soils types include wide extremes.

In the fruit-growing areas in some of the interior valleys, irrigation is necessary and the control of water erosion is a problem. In the Fraser River Valley, soil fertility and the control of periodic flooding of farm lands are important problems. In Northern British Columbia, grey wooded soils are encountered which present serious difficulties.

Conservation Projects Conducted by the Federal Government

There is no organization in Canada similar to the Soil Conservation Service of the United States Department of Agriculture, nor is there any arrangement for payments to be made to farmers for the growing of soil conservation crops. In Canada, the Federal Department of Agriculture undertakes conservation work principally in two regions, under the Prairie Farm Rehabilitation program and the Maritime Marshlands Rehabilitation program.

The Prairie Farm Rehabilitation program, which is usually known as the P.F.R.A., was initiated in 1935 through the enactment by the Federal Government of the Prairie Farm Rehabilitation Act. The purpose of this Act, which is limited in its application to the drier parts of the Prairie Provinces, was to enable farmers to combat the effects of drought, soil drifting and the economic depression, which at that time were being experienced with unusual severity. In the province of Saskatchewan, with about 15 million acres of wheat, the provincial average yield during the ten-year period from 1929-1938 was only 9.5 bushels per acre and, in the worst year, in 1937, only 2.7 bushels per acre. Intended at first as an emergency measure, the P.F.R.A. has become a long-term program for improved land utilization and water conservation.

The land utilization program of the P.F.R.A. deals mainly with the permanent withdrawal of submarginal land from cultivation and the development on such land of community pastures. A total area of 1,590,200 acres of submarginal land had been developed by March 31, 1952, into 57 community pastures. This pasture, under P.F.R.A. management, was provided to nearby farmers at moderate cost. The farmers who had been removed from these submarginal areas have been assisted in becoming re-established on better land. This is a distinct advance in government policy concerning conservation.

The water conservation phase of the P.F.R.A. program includes the construction of small water conservation projects, such as dugouts or farm ponds, storage dams, small and large irrigation projects, together with the necessary land reclamation. By the end of March 31, 1951, the P.F.R.A. had provided on private farms for the construction of 37,864 dugouts, 5,803 small stock watering dams, and 2,025 small irrigation projects. There were 101 large irrigation projects completed, covering a total irrigable area of 236,565 acres. Some 113 large water storage projects have been completed, impounding a total of 126,450 acre feet of water which is used mainly for stock watering purposes. Large irrigation projects now under construction will provide for over 433,000 acres of new irrigable land. The P.F.R.A. irrigation projects, completed and proposed, may ultimately increase the acreage of irrigable land in Western Canada from some 900,000 acres to approximately 2,400,000 acres. In addition, some 366,000 acres now rendered useless by flooding may be reclaimed. These water conservation projects, it is felt, will promote a better utilization of the agricultural resources of the country.

In the provinces of Nova Scotia and New Brunswick there are some 87,000 acres of marshland which are protected from the sea by dykes. These dykes were first constructed when the French occupied this region about 300 years ago. They were built by hand in an era when labor was cheap, but under present high labor costs have fallen into disrepair. There are high tides in the Bay of Fundy reaching in many places from 30 to 50 feet and these tides render the maintenance of dykes extremely difficult.

When dykes collapse not only is farm land flooded, but railroads, highways and other property are endangered. Accordingly, in 1948, the Federal Government passed the Maritime Marshland Rehabilitation Act under the provisions of which, in cooperation with the provinces concerned, it assists in restoring this land. The Federal Government defrays the cost of constructing the outside dykes, the provinces pay for the inside drainage canals, and the farmers the expense of draining their own land.

Conservation Projects Conducted by Provincial Governments

Many of the Provincial Governments in Canada, including provincial departments and colleges of agriculture, are undertaking a large number of projects which, although not all called conservation, actually promote this type of work. Each province has special problems depending upon its own local conditions. In some of these projects the work is financed jointly by the Provincial and Federal Governments.

Government control in the use of submarginal land for crop production is practiced to some extent in several provinces of Canada. In some provinces, such as New Brunswick, Quebec and Ontario, this authority is limited mainly to the control of new settlement. In Saskatchewan and Alberta, the provincial governments exercise considerable control on range land and abandoned, submarginal farm land, as well as in new settlement. In Saskatchewan, all government-owned submarginal land is administered by the Land Utilization Board which in 1951 had some 6,823,000 acres under its supervision. In Alberta, the Special Areas Board controls some 6,000,000 acres. Most of this land is leased to farmers for grazing purposes and its use for crop production is severely restricted.

During the early development of irrigation in Alberta, it was necessary for the province to provide financial assistance for several projects. Today, many of these are in a quite favorable position and irrigated land is much more valuable.

The most extensive program of land drainage in Canada has been undertaken by the Province of Quebec. Large ditching machinery has been provided by the province to provide drainage for farmers at low cost. Since 1945, some $15,000,000 has been expended by the provincial government to assist farmers and municipalities to drain farm land. Some other provinces, also, have assisted farmers in a similar manner to drain their land. In Ontario, assistance is given to farmers by providing engineering services, arranging long-term loans, and granting certain financial assistance to municipalities.

Government assistance in clearing land for crop production is provided to farmers in the provinces of Newfoundland, New Brunswick, Quebec, Ontario and Saskatchewan. In Alberta, large scale land clearing operations for settlement purposes are undertaken by the provincial government.

Agriculture in Western Canada is a comparatively recent development, while in Eastern Canada most of the farm land has been under cultivation for over a hundred years and some for as long as three centuries. In Western Canada, in 1881, there were only 461,864

acres of improved land, but in 1951 this had been increased to 72,987,400 acres. In Eastern Canada, on the other hand, the maximum area of improved land was reached in 1891 with 27, 050,477 acres, but by 1951 this had declined by some 3,267,712 acres of which 1,907,432 acres were in the Maritime Provinces.

All the eastern provinces and British Columbia, in cooperation with the federal government, provide a subsidy for the use of limestone. The amount used has increased five times during the last fifteen years. The use of commercial fertilizers is not assisted by the governments, but the quantity used has tripled during the last twenty years.

The Province of Ontaria and a few other provinces provide technical assistance for farm planning. Maps are made of individual farms and programs suggested for erosion control and improved cropping. This program, however, has not yet been extensively developed in Canada.

Some 13 Conservation Authorities have been established in Ontario. The primary function of these authorities is to control flooding, but attention is given also to improved land use, reforestation, recreation, wild life preservation and the prevention of the pollution of streams.

The Soil Survey, which is so fundamental not only to any sound approach to soil conservation programs but to many agronomic and economic investigations as well, is undertaken by the Provincial Departments or Colleges of Agriculture in cooperation with the Experimental Farms Service of the Federal Department of Agriculture.

Agronomic Investigations

The foregoing sections of this paper have referred to the principal conservation problems in various parts of Canada and to some of the more important programs which have been undertaken to promote conservation. As conservation methods, in a very large measure, are based on agronomic knowledge, it might be of interest to mention a few agronomic investigations which relate to this subject.

1. *Field Crop Shelterbelts*:

Many benefits have been claimed for shelterbelts, but very little definite information is available to prove what effect large-scale tree planting would provide for field crops in dry regions. No one doubts the advantage derived from planting shelterbelts around the farm buildings, but it is quite a different situation for large field areas. The Dominion Experimental Farms have four field crop shelterbelt projects established in the Prairie Provinces from which in a few years it is hoped to secure some reliable information. The largest of these field shelterbelt projects, at Conquest, Sask., comprises some 126 square miles of formerly treeless farm land where now trees have been planted around the fields. A group of specialists, including foresters, agronomists, and soils men, are working on this problem in the hope that all angles may be covered and any predilections neutralized.

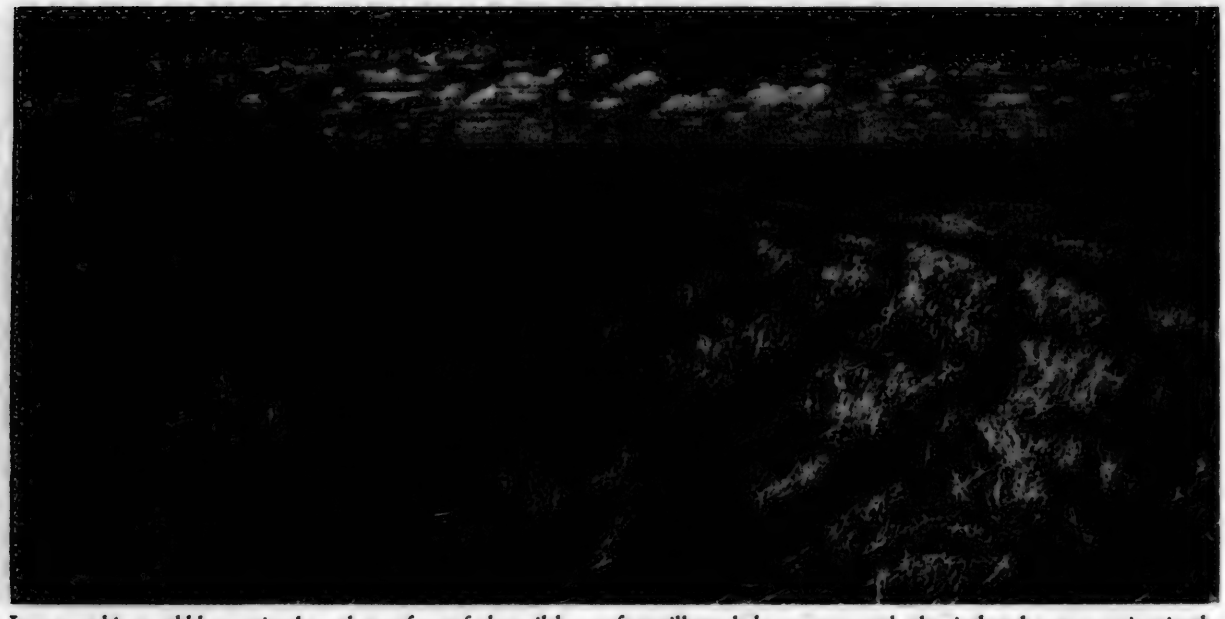
2. *Widely Variable Residual Effects from Legumes*:

Very striking differences are obtained in different parts of Canada on the residual effects from legumes. In some instances, yields following legumes are increased as much as 100 per cent, while in others the effects are negligible. In some cases the beneficial effects may persist for several years after the legume crop and even where a summerfallow has preceded the indicator crop. These results do not seem to follow any pattern. Good results are not confined to infertile soils, they may occur on light or heavy soils, on clay or sandy loam, on soils with high or low organic matter, and in humid or subhumid climates. Only in the grey wooded soil zone do the beneficial effects of legumes seem invariably to occur. This is an important problem on which further information would prove very valuable in soil conservation work.

Strip farming, with alternate strips of grain and summerfallow, has been widely adopted in certain districts of Western Canada for the control of soil drifting. When arranged on the contour, this practice helps to control water erosion.

3. *Grey Wooded Soil Zone*:

This soil zone contains the greatest area of land available for agricultural settlement in Canada. Compared with the brown, dark brown and black soil zones in Canada, it is relatively unproductive without certain improvement treatments. With these treatments, it is almost equal to the black soils. As previously mentioned, legumes are indispensable. Sulphur is essential on some, but not all of these grey soils. Phosphorus is valuable and farm manure gives good results. What combination of treatments will give best results on the various soil types in this soil zone and under various climatic conditions, is yet to be learned, but will prove very valuable for this extensive region.



Long combine stubble, retained on the surface of the soil by surface tillage, helps to prevent both wind and water erosion in the Prairie Provinces. It gives rise to new problems, however, as to the most efficient methods of handling this stubble.

4. *Acid, Unproductive, Sandy, Podsolic Soils*:

There are certain areas of unproductive, sandy, acid, podsolic soils in Eastern Canada that present serious problems. These soils can be improved to a level of productivity where satisfactory field crops can be grown, but it is a problem whether this can be done economically. Heavy applications of commercial fertilizers must be made because the crops are so poor it is impossible to feed enough cattle to produce sufficient manure. Considerable limestone must be used to grow legumes, but large amounts cannot be applied if potatoes are to be produced. Is it possible to raise the level of fertility and then to maintain it by the use of farm manure and limestone alone with very little or no fertilizer? Further investigations seem necessary to learn what constitutes submarginal land for various field crops. At what point should conservation not be attempted for such crops?

5. *Tillage and Cropping Methods for Soil Drifting Control*:

In the Prairie Provinces, trash cover and strip farming have become, over a long period of years, the best methods for soil drifting control. With the recent widespread use of the combine harvester, longer stubble is available and many farmers feel that stripping is no longer necessary. This trend may be a recession rather than an advance. Certainly if a succession of dry years should again afflict the country, as seems certain to happen some time in the future, little trash stubble will be available and only emergency tillage methods can be used.

Improved tillage and seeding machinery have been developed in recent years. Implements which leave the trash on the surface but at the same time control the weeds are definitely an advantage. The use of blade implements is becoming more extensive. Press drills seem to give better results under dry conditions. Where excessive trash is present, care must be taken to avoid a deficiency in available nitrogen in the soil.

6. *Regrassing*:

Marked advances have been made in regrassing submarginal farm land and even unproductive range land. The use of crested wheat grass, which is particularly well suited to semi-arid regions, also enables more efficient grazing in allowing livestock to pasture early in the spring, a practice which is quite harmful to most native grasses. Considerable progress has been made in developing a new creeping rooted strain of alfalfa, which, if ultimately successful, will certainly promote increased productivity on both range and farm land.

The Relation of People to Natural Resources

J. S. RUSSELL

J. S. Russell

Failure in many parts of the world to utilize properly the natural resources is creating unrest that threatens the peace of the world and makes people vulnerable to the encroachment of communism. This world situation, points out Mr. Russell, is a challenge to the friends of Conservation in America to provide leadership and to demonstrate the value of proper land use.

Because of these conditions, it is extremely important that we do a good job of resource conservation and development at home. It would, more than anything else, set an example for the rest of the world.

CERTAINLY THIS SUBJECT could, in its broader implications, encompass a very wide range of both the physical and social sciences—and on a global basis.

For purposes of our consideration, however, it would seem that the scope be limited to an understanding of the soil, water and timber resources here in America and also the utilization of these same resources in other lands to the advantage of those peoples as well as to our own advantage.

This seems important in relationship to the well-being of those peoples as well as our own best interests.

Sir Thomas Malthus, nearly 150 years ago, came forth with the gloomy prediction that the peoples of the earth were engaging in reproduction to a point that population would soon outstrip the production of food. In other words, he said that we were headed for mass starvation. This point of view has been expressed time and again and perhaps fears along this line should be credited with having spurred our efforts to conserve, protect and build up our natural resources.

But, after paying due credit to Sir Thomas for having warned us of what was ahead, let us admit that we have made notable progress toward disproving the Malthusian theory. How well we eventually meet this problem of increasing population here in America with about the same amount of cultivated land we now have, remains to be seen.

Proper use of our natural resources, as well as their conservation and improvement, constitutes a goal which we can recognize and toward which we are even today making progress. The statement before this organization a year ago by Dr. Firman E. Bear that America is capable of producing enough to feed a billion people, provided an encouraging note.

We certainly are in no position, as of today, however, to think of feeding this many people and certainly not on the present level of nutrition. Two-thirds of the people of the world actually have no appreciation of the fact that the American people eat so well—actually on a luxury diet of steak, butter, cake and ice cream.

We Begin at Home

In discussing the matter of the relation of people to natural resources, suppose we consider first our own people and our own natural resources and then devote some attention to the position and relationship of some of the "have-not" areas in the world. In the way we meet our own problems and to the extent that we can make some of our know-how available to the countries that have too many people on too little land, we have an opportunity to aid in promoting a better lot and atmosphere physically, psychologically and politically in some of the trouble spots of the world.

In our own efforts at home, we may as well admit that we have not much more than scratched the surface in

---

This paper by J. S. Russell was presented as the keynote address at the Seventh Annual meeting of the SCSA held in Buffalo, New York, October 23-25, 1952. Mr. Russell is Farm Editor of the Des Moines Register and Tribune. His headquarters are in Des Moines, Iowa.

Mr. Russell recently visited various countries in the Far East and South Asia to learn first hand of the problems of land tenure and food production.

protecting natural resources of soil and soil fertility and forests. There is the big problem of bringing water under control to a point where it can be a servant of man rather than his master.

If we can solve our own problems of protecting and utilizing properly our natural resources—and, in this, we must not fail—it is going to be up to the men who know and practice the science and profession of soil conservation and water control, soil and land and timber management, to do it.

We already know many things that have to be done, but we have not yet developed the technique of getting people to do them. It's necessary to have the co-operation of many persons interested and devoted to the cause of conservation who are engaged in business, in agriculture, in education, in agricultural financing, in the fields of communication, advertising, press, radio, television, in government. That's where the non-professional members of this and other groups devoted to soil conservation come in.

What better opportunity is there in the nation today to serve the cause of soil conservation and of the people of the land than an organization like the Soil Conservation Society of America? It brings together into one group, men with the scientific know-how and other interested citizens dedicated to furthering the cause of conservation.

Now we are going to need governmental programs to carry out soil conservation, but we need better co-ordination and unification of such programs at all levels, national, state, and county or local.

We Have Made Progress

We have made some real progress in this job of getting conservation of natural resources recognized as a responsibility of all the people and that protection of the soil for use of future generations is in the interests of the public welfare.

In the application of federal programs in the field of conservation we have a particularly effective instrument in the soil conservation district. It is locally governed and yet employs the services of the federal technicians of the soil conservation service.

We might well center even more responsibility in the conservation field in these districts.

Conservation of natural resources and making them more useful to mankind is a mighty broad and a mighty important subject. We are prone to think only in terms of America and it is right that we should put our own homeland first and foremost. But also we must remember that what we do here at home has a broader effect throughout the world.

Lest we become complacent over our efforts in the direction of soil and water conservation, it is well to take a look at the contribution made by scientists and husbandmen in other lands. Man's destiny, even his very life, in many lands, depends directly on how well he can use his bit of land.

There are the constructive lessons to be learned from seeing how the Japanese farmer—and the same is true even in troubled Korea—terraces the hillsides and the mountains to utilize every square foot of land and in these tiny level stairsteps of rice paddies, catch and hold every available bit of water.

The terraced hillsides in the Rhineland of Germany and in other portions of western Europe also emphasize how every possible square foot of land is in production. The use that the farmers of the British Isles make of pasture and grass, the devotion of the French farmer to his manure pile for organic matter and fertility, and the use of the compost pits by the Chinese farmers on the island of Formosa, I submit to you as evidences of the recognition of what the land means to the farmers who have so little of it. The intensive cultivation and land use by the Dutch farmers who must depend in part on polders of "filled-in" land around the Zuyder Zee is further evidence of the intense cultivation in some areas where there isn't enough land to go around.

But let us get back to what we can do here in the United States to keep ahead of the trends of the times in this race to boost food production fast enough to meet the needs of a growing population.

That is our first and foremost job. We can not think today in terms of 120 to 125 million mouths to feed here at home any more like we could a couple of decades ago. Our population is nearing 160 million and by 1975 the outlook is for 180 to 190 million, considering the current birth rate and the fact that folks are living longer. And even though some of us may not be around by the year 2,000, even considering this tendency toward longevity, the present curve of population increase could easily carry the total up to 220 to 230 million. The prospects are for us to continue to face the task of feeding nearly 50 per cent more mouths than we have today with about the same number of acres under cultivation as we have today. Instead of 2½ acres per person of land under cultivation, we may as well consider the problem of getting the job done with no more than 1½ to 1¾ acres of cultivated land per person.

There are Optimists

Thank goodness we have some optimists to keep us from stewing in the gloom cast by consideration of the Malthusian theory of starvation with the increase in population. Dr. Robert M. Salter, who succeeded that great evangelist of soil conservation, Dr. Hugh H. Ben-

Flooded rice paddies are shown in foreground along the Communist China boundary in New Territories of Hong Kong. River is the dividing line. British governed territory on this side, Communist China on the other.

nett, as head of the Soil Conservation Service, believes that we can and will produce bigger yields of food, feed and fiber through sound land management, soil conservation, use of more fertilizer, and reliance on other improved production techniques. The recent report on capabilities of farm and food production issued by the United States Department of Agriculture is reassuring for the future, but there are many IFs that American agriculture and American conservationists must observe to meet this challenge of producing more food on the same acreage.

You know what these things are and we can not afford to neglect any of them—better land utilization and management, more organic matter, chemical fertilizer, terracing, contouring, and control and conservation of water in the interests of flood control, irrigation and prevention of water erosion, pasture improvement, timber management and reforestation are some of the more apparent steps that we need to take.

I am repeating some of these things, which a group like this knows only too well, for the purposes of emphasis and also to cite the dependence that we must place on sound principles instead of following will-o'-the-wisps like hydroponics, synthetic foods, and extreme devotion to the organic farming cult. Some of these techniques and methods may have merit. In Japan, not long ago, I learned that the United States Army had been able to produce vegetables in tanks of water without soil, using hydroponic methods, but I was not able to learn just how costly this process is.

Another reason for dwelling on the importance of doing a good job here at home is that our first lesson should be to set an example for the rest of the world before we begin to tell peoples of other nations how they could work out improvements on their own land. We cannot feed the world although we may be able in the future, as we have in the past, to share some of our production by providing needed food for other nations in emergencies. But most of all we must set an example of a strong, free nation utilizing our natural resources to guarantee an ample diet for our people and raw materials to supply our requirements for industry as well. We hope that we can continue in emergencies to provide temporary relief to areas threatened with famine.

Challenge to America

Knowing how to make better use of and to protect our natural resources will not be enough in the years to to come.

We must meet the challenge of keeping America strong and well fed. Another challenge is that of lending leadership to other parts of the world where it would seem today that the Malthusian theory is in real danger of fulfillment unless methods of handling the land resources are improved.

Within the next few years we must step up adoption of soil conservation practices in the United States. We, as an organization, must accept the responsibility of doing our share toward this and working with the governmental, local and private agencies devoted to saving the soil.

Take the Far East and Asia, for instance, where many

people in countries like India do not know what it is to have enough to eat.

In Japan there is a ratio of less than .2 of an acre of cultivated land for each person, about .25 in Formosa and a little more than half an acre in India. This compares with about 2½ acres per person in the United States.

Suppose we talk for a few minutes about this part of the world where so many people live on so little land.

This is a part of the world where a third to a half of all the people on the face of the earth live and where the pressure of population is so terrific that this in itself has made these people susceptible to the wiles and the promises of the Communists.

There are other reasons why the Orient and South Asia are seething with unrest.

Here are very old civilizations but very new governmental setups—Japan, Korea, the Philippines, Formosa, Indo-China, Indonesia, India, Pakistan.

Most of them are beset with hunger and poverty and saddled with usurious interest rates and an intolerable feudal land setup, with a large share of the crop going to the landlord for rental.

Primitive production methods hold down the total crop and the system in many cases leaves little for the tenant and his family to eat. Small units limit the production per family and per farm.

The use of the land varies by countries. In Japan, for example, with the careful husbandry of the Japanese farmer, using copious quantities of "night soil," or natural human fertilizer, and raising mostly two crops a year, probably optimum yields are being obtained from the land.

But even so, Japan must import food.

Population increases seem to be outstripping the land improvement program designed to boost production.

Farmers in Formosa are on a self-sufficient basis as far as food for the people on the island is concerned and even have a small surplus for export.

In the southeastern Asia peninsula is the rice bowl of the world and leading export countries are Thailand, Burma and Indo-China.

But food production and rice exports here are lagging far behind their potential.

War with the Communists in Indo-China and civil unrest in Burma hinder food production there, and somewhat the same comment could be made on the war situation in Korea and the Huk-guerrilla sniping in the Philippines.

In countries like the Philippines and Thailand some of the lagging production might be attributed to lack of incentive.

In India food imports in 1952 are running from four to five million metric tons of food grains.

Pakistan, the Muslim portion of the sub-continent of Asia, is beset with the problems of distribution. Even with some surplus in the Punjab area of West Pakistan, people have been starving in East Pakistan.

In many of the countries of southeast Asia improper use of the land is a deterrent to full production.

Millions of Acres Idle

In India there are literally millions of acres of idle land.

Conservation, control and proper use of water sources would help here. The same is true in the Philippines.

It is in this field that the soils specialist and the conservationist could add their know-how to that of the crops and production experts. Land reform in all its phases would help provide incentive for tillers of the soil and remove the causes of unrest on which Communism feeds. (If you don't think so, just check on what happened to China and to the arguments being used by Communist agitators in Asia today.)

Now am I suggesting that the Soil Conservation Society of America undertake global responsibilities?

Not exactly. But I do think there are some things that we as individuals can do.

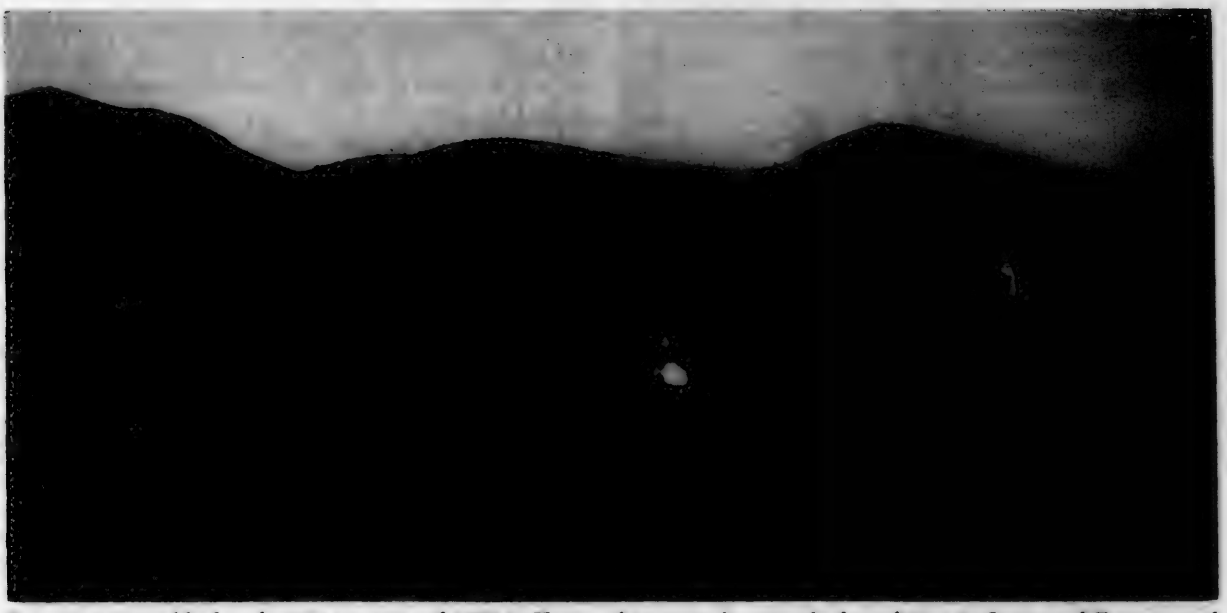
In the first place no one yet has come forth with any pat solution to the problems of the pressure of population on land.

We have had many suggestions, such as:

1. Reliance on the Four Horsemen of the Apocalypse to hold down population. Nations like India already have had experiences with famine and pestilence. War tends to reduce population but God forbid that we should ever accept starvation or war as a way out of population pressure problems.
2. Birth control.
3. Emigration to North America, South America or Australia.
4. Industrialization, which releases people from the land and frequently results in a lowered birth rate. Right now India has 80 to 85 per cent of its 363 million population on the land and it will take better farming and food production methods to make possible any great shift of population to the city and industry.
5. Hydroponics and synthesizing of food, but I doubt that we need count much on such methods. Synthetic compounds to increase our nitrogen and protein feed supply hold great possibilities, however.

Food, Population Balance

I doubt that any one or perhaps none of the foregoing holds any great possibilities for bringing into balance the population and the land under cultivation or



Preparing rice paddy for planting in spring of 1952 in Korea—this scene also typical of conditions in Japan and Formosa and other rice countries. (I was too late for planting season in most other countries.) Note some handling of water at different levels.

the food production in these areas.

In countries like Japan there is need for greater food production to meet the increased population trend. This presents a most difficult problem because the land is limited and the production already is highest of any area in the Orient.

In the Philippines proper use of natural resources would enable that country to be self-sufficient as to food instead of importing rice.

In the rice bowl in Southeast Asia greater stability of government, peace, and greater incentives to increased food production would make possible a much greater output and relieve the precarious balance between adequate food supplies and starvation now existing in southeast Asia.

In India and Pakistan there is need for more food, particularly in Hindu India.

Here again incentive plays a part in the effort to be put forth by the individual cultivator.

Reform of the land tenure system is badly needed so that the cultivator could retain a larger share of the crop than at present, be able to get credit at reasonable rates instead of the 30 to 100 per cent (or even 100 to 300 per cent per annum in some countries) now prevailing, and to look toward individual ownership of land. The land reform programs in Japan have made—and in Formosa are making—capitalists and landowners out of some of the victims of the feudal land system. That is the best bulwark against Communism that we could have in the Far East.

This step is badly needed along with the technical assistance in the countries of the Far East and South Asia. Through the United Nations' FAO and through our own missions—TCA or Point 4 and MSA—we can and must help with this kind of a program.

We need to work with the people and help them achieve their freedom from slavery under a system of land holding and land and credit handling that leaves them susceptible to Communist lures of "land for the landless."

Right today the Communists are moving in and taking possession of land in parts of India. There is just as much danger from Communism erupting from within, through infiltration and capitalizing on hunger and unrest, as there is from invasion by military force as in Korea and Indo-China.

There is another factor in promoting land ownership and in helping people to help themselves and that is in control of the land by the man who cultivates it.

When your very life depends on use of your bit of land and you know that improvements in its production and handling of it will accrue to your benefit, then you will appreciate and treat the land as it should be treated.

But wanting to isn't enough, neither is incentive enough. The cultivator must have something to do with, and know-how. That is where we can help.

There are vast unused resources of both land and men in the sub-continent of Asia—India and Pakistan—as well as in southeast Asia, the rice bowl countries and the Philippines.

Instead of India being a food importing nation it is possible for enough food to to be produced for the people of that vast and important nation to feed themselves. At least it is possible to produce enough to feed the present population. If there is only a deficit of ten per cent in the food supply, an increase of around ten per cent would provide enough for at least a minimum diet for the present population. We must remember, however, that within ten years it might require another ten per cent increase to feed the population at that time, barring famine or pestilence which would hold down the increase.

How to Boost Output

How can this be done?

The important keys to increased production in India are:

1. Improved methods of production, better seed, better methods of culture, better implements, better farming methods.
2. Use of fertilizers, both chemical and natural. In this should be included the matter of organic matter and plowing under of forage or legume crops and crop residue.
3. More water on land that would permit more stability of crop production and also make possible growing crops for green manure in the winter or off season.
4. Bringing into production of additional land through clearing it and increasing water supply for irrigation. This can be done by depending on small bodies of impounded water, damming up rivers and sinking of shallow tube wells.
5. The additional factors of protecting and using crops once they are grown. This includes transportation, marketing, distribution and storage of crops.

The sacred cows of India are a factor in this picture. Many bands of cattle, protected through religious worship of the cow, roam the countryside destroying crops. The same is true of the monkeys.

If India were to practice reforestation on some of the land now unfit for crop production, to use the cow manure (dung) for the soil instead of fuel, one definite step forward could be made.

Green Manure and Plows

India needs crops for green manuring, better plows for turning it under, more power to pull those plows and then some real progress could be registered.

Confirmation of some of these points of view is contained in a letter just received from Horace Holmes, leading Point 4 specialist in India and advisor on agriculture to the government of India.

Horace is even more optimistic than I have been in my preceding remarks and I quote from his letter:

"My observations are that if the present water and soil resources can be utilized and conserved, India would not suffer a food problem, but could even produce a surplus. I base this upon our experiences with such simple things as green manure and improved tillage. There are many instances here where the present yields of crops have been doubled. Only an eight per cent increase is necessary to take care of our present shortage. Green manure will do much to conserve the soil moisture. This one practice alone would, I believe, solve our problems.

"Many ruins of villages are to be seen in what is now desert. I am convinced this area was not desert at the time the villages were built.

"It would appear that many of our current problems are man made. Over-grazing by the millions of cattle and wanton destruction of forests have turned the fertile areas into desert.

"Last week, I flew over a long stretch of the Gangetic Plain. There was a patchwork of cultivated fields, but nothing worth while was being produced on more than 20 per cent of the land. This is a problem that has developed over hundreds and perhaps thousands of years, and no quick remedy is possible. It is, however, a problem in which a start can be made and I believe that the small demonstration areas are the places to make a start."

Many of these same things could be applied to countries like Thailand and the Philippines where resources are not utilized up to capacity.

It is not tractors and combines that India needs today but more of the technical assistance, Point 4 aid for the people there to help themselves.

The Damodar river project in eastern India will bring a million acres into production when it is completed and the Thal river project in Pakistan holds forth great possibilities. The lesser projects are easier to get into operation and may produce results more quickly than these mammoth TVA type undertakings.

There is another field in which a great contribution can be made toward the utilization of natural resources in the subcontinent of Asia and that is checking the salinity of the soil. Hundreds of thousands of acres are being rendered unproductive each year because the rapid evaporation causes a salty condition of the soil that renders it unfit for adequate crop production and in some cases unfit for any use.

There are three lines of attack on this problem. These include use of more water, use of organic matter and possibly the use of some of the synthetic soil conditioners which have been brought out in America within the last year. They are not yet on a basis where either quantities are available or prices reasonable enough to permit wide agricultural use, but use of limited quantities in

conjunction with more water might restore some of these saline areas to production. Rice is reasonably tolerant to salt so there is hope for this crop, which is a vital one in south Asia.

If the annual production of rice and of wheat per acre could be increased by as much as 100 pound per year, India's food problems would be greatly lessened if not solved. The present average on 200 million acres is only ten bushels of wheat per acre and the increase of 100 pounds per acre would mean a gain of 16 per cent in the case of both wheat and rice.

Natural Resources Key to Future

If India and some of these other countries in the Far East and South Asia are to remain in the orbit of the free world it is going to take prompt and effective measures to use to better advantage both the natural and human resources of these vast countries.

The natural resources are there and can be developed. Pressure of population probably will continue but it can be eased through use of the kind of conservation we have been talking about. We can build up the soil and prevent its further depletion through better land use by returning to the soil more humus and organic matter, application of chemical fertilizers, putting more water on the land and then farming the land better.

This can and should be coupled with reform of land tenure methods and farming methods so necessary to achieve increased production.

This is a program for the Orient and for Asia. In this way we can alleviate unrest and thus check the spread of Communism.

At this point I would like to emphasize an idea or two and repeat a phrase or two from two prominent soil scientists.

Dr. William Albrecht of the University of Missouri is an advocate of reconstructing soils to meet human needs and points out that war is an expression of mankind's hunger.

And I liked particularly the subject of a speech in Canada recently by Dr. Charles E. Kellogg of the U. S. Department of Agriculture which was entitled "Using Our Soils to Keep Men Free."

Use Soils to Keep Men Free

Certainly we can use our soils to provide the food to make men strong and nations secure, and to keep men free.

By relieving hunger and bolstering natural resources we can lay the groundwork for freedom and democracy. The seeds of Communism and of war always have flourished in the seedbeds of dissatisfaction and unrest brought about by hunger and want.

Example of contouring and terracing on hillside in Korea. Crop is barley and preparations being made for interplanting.

The first task before us is to start at home to conserve and use to best advantages our natural resources. This we must do before we can make any effective move to help the people of other nations to save and to make proper use of their soils.

There is this need, however: To pass on the know-how of conservation and of production to help others to help themselves.

This is no local problem. It is world-wide and age-old.

It is a task not just for this day nor for this decade, but for future generations.

There is a direct relationship between the people and their well-being and their freedom, and the natural resources which form the basis for all wealth and all civilization and man's very existence.

The challenge we face is one of protecting and using our soils at home to keep America strong and well-fed and to further the cause of freedom and democracy on our own shores.

And there is the additional challenge to help others to make the soil and its products instruments of freedom and peace on this earth.

Coastal Bermuda Grass on Conservation Farms

W. W. HULL

One of the new grasses being used extensively for soil and water conservation in the sandy part of the Cotton Belt is Coastal Bermuda. An old-time cotton farmer returning to this area after an absence of twenty-five years would be amazed. In his days the cotton and peanut farmers fought grass, especially Bermuda. Now they are planting, fertilizing and managing it as carefully as they did crops of cotton, peanuts, and corn.

This change in attitude is due to several developments.

Grass is worth more now due to much higher prices of meat and milk.

Better grasses have been found and developed for the Cotton Belt.

The soil conservation movement, so popular in the South, stresses more erodible acres in good grass for pasture and hay.

Developed at Tifton, Georgia

Coastal Bermuda grass was developed at the Coastal Plain Experiment Station, Tifton, Georgia, by G. W. Burton. It is a hybrid between Tift Bermuda and a South African Bermuda. Tift Bermuda was found near Tifton by J. L. Stephens of the Experimental Station. Coastal Bermuda was chosen as the most desirable of more than 5,000 seedlings, which were carefully grown and studied. According to the Experiment Station at Tifton, Coastal is superior to common Bermuda in "disease resistance, frost tolerance, fall growth, rate of establishment, drought resistance, sod density, ability to maintain a weed free sod, nematode resistance, chemical composition, and yield of hay and pasturage." Results obtained by hundreds of farmers fully justify these claims. A further advantage is that it produces few, if any, viable seed, and is not likely to become established where it is not wanted.

Coastal Bermuda grass is propagated from sprigs. It needs more care in planting and maintenance than common Bermuda. The first sprigs were distributed to farmers by the Coastal Plain Experiment Station at Tifton. The Florida Experiment Station also distributed a moderate quantity. The Soil Conservation Service nurseries produced much larger quantities which were distributed through soil conservation districts to cooperating farmers. Now farmers are producing most of the sprigs used. A few growers are producing and selling certified sprigs.

W. W. Hull is Zone Conservationist for the Soil Conservation Service with headquarters in Spartansburg, South Carolina. He is a member of the SCSA.

A Rapid Growing Sod Crop

Coastal Bermuda grass makes a full sod rapidly if properly handled. Soil Conservation Service workers were quickly "sold" on its good qualities and began to use it in their farm planning work for pastures on sloping lands and for sod in waterways. When properly handled it has covered the land quickly and provided excellent grazing and hay. Some difficulty has been experienced in confining it to waterways. This has been overcome by planting sericea lespedeza along the outside edge of the channel.

Experience at the Experiment Stations, the Soil Conservation Service Nurseries, and on many farms has shown there are six essentials for getting a quick, dense sod of Coastal Bermuda grass.

1. Prepare the soil well.
2. Use good, live planting sprigs.
3. Plant carefully.
4. Fertilize well.
5. Give good cultivation to eliminate weeds.
6. Use sparingly until well established.

If these essentials are followed, a dense sod can be expected in four to six months of warm growing weather. If any of the six essentials are not provided, a much longer time is required.

One of the hazards in successful planting of any kind of Bermuda grass is injury of the sprigs by drying. This may be acute when the sprigs are carried long distances. The establishment of local nurseries of Coastal Bermuda grass has reduced the hazard of drying out. Several types of mechanical planters have been used successfully. One made especially for Bermuda grass has been very popular, due in part to considerable saving of labor. The use of these mechanical planters has resulted in faster planting, and thereby larger acreages planted.

Other Crops with Coastal Bermuda

Crimson clover and blue lupines have successfully grown on Coastal Bermuda sod, mainly during the cool season when the grass is dormant. Annual lespedeza is generally suppressed by the vigorous grass, unless it is managed very carefully.

It is not known how well Coastal Bermuda can be used in a rotation with cultivated crops. A few instances of corn after Coastal Bermuda have been successful. With careful management, the grass becomes reestablished in the middles between the corn rows. It is possible that farmers in the South will soon be planting Coastal Bermuda on cropland for a planned, systematic rotation.

Wildlife and the Business of Farming

DURWARD L. ALLEN

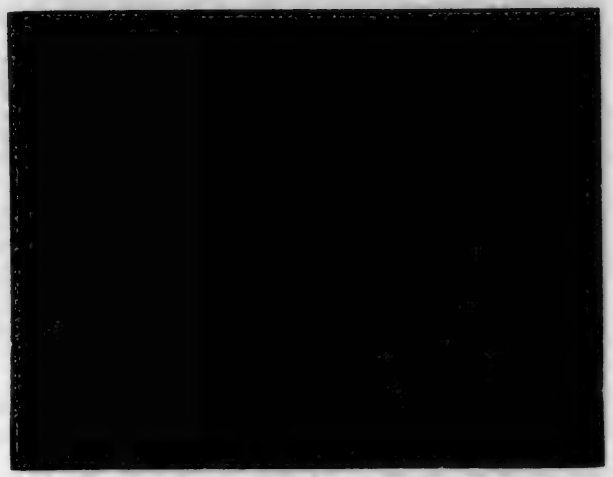
There is a growing appreciation for wildlife as a part of our American standard of living. Esthetic and recreational benefits increase steadily in value as the population increases and land use becomes more intensive. By virtue of their fertile soils, agricultural lands have a high potential yield of useful creatures, and they are accessible to large numbers of people. Research is needed to develop better wildlife techniques that will fit the land-use plan, and a more effective legal structure must be created if public hunting and fishing are to continue on private land.

MODERN INDUSTRY has found that, as competition grows, it is increasingly worth while to be concerned with the fine points of efficiency and the use of by-products. Likewise, an expanding population places an ever-growing premium on the wildlife by-product of our great land-use industries, of which agriculture is the most important. It seems evident that this by-product now has become sufficiently useful to enough people that it deserves serious consideration.

At the outset, it might be well to define what the main values of wildlife are. To most farmers, and to most other people, wild birds and mammals are an indispensable part of the landscaping plan for nearly any place we would like to call home. Almost everyone enjoys the presence of such creatures regardless of who he is or where he may be. There was a time when this would have seemed a sentimental and impractical viewpoint, but today it probably needs no defense. The esthetic value is real, and when we reject it, it will be time to pave Washington's flower beds and turn them into parking lots.

Secondarily, but also important, are the more specific recreational values of wildlife. Hunting and fishing become a greater issue every year. At least 25 million Americans spend a portion of their outdoor time in these pursuits. Of course, various birds, mammals, and fish also have use as food and fur. These benefits are not to be neglected, even though they are of less consequence than they once were.

Present trends are towards greater land-use efficiency, and there is obvious need for a plan in growing and using wildlife crops. This has all come about rather recently, for it was characteristic of the early, free-and-easy period in our history that we could afford to take products of the wilderness for granted, and there was little need for restrictions. We were not sentimental about such things. We fattened hogs on passenger pigeon squabs and killed buffalo for their tongues. The wilderness and what went with it were something to be used up and gotten out of the way. An early farmer in the east was hemmed in by the forest. It was an enemy he could overcome only by the most painful effort. There is little wonder that "clean farming" became his slogan when the land-clearing battle was won and there was time for mopping up.



Multiflora rose and similar shrubs can be a part of our "planned economy" for wildlife. Living fences, field borders, and hedges have agricultural values.

Clean farming had its day, but you don't hear so much about it anymore. Many people are acknowledging that brush and trees are not unsightly and not a sign of indolence. We are finding uses for woody vegetation that are worth consideration even though some of them are not appraised in terms of dollar income. Hedges, windbreaks, living fences, field borders, and farm ponds in the proper locations can have value in the farmer's crop-raising business and, of course, they form an important part of the habitat of many birds and mammals (1, 2). Such tailor-made measures can be a part of our "planned economy" for wildlife, but it should be emphasized that the briars, vines, and shrubs that grow in an old stabilized gulley or on a critical slope fenced off in a pasture also are an acceptable feature of the farm landscape and useful in the long-term protection of the soil. Probably the new and progressive attitude that is

Durward L. Allen is Assistant Chief, Branch of Wildlife Research, Fish and Wildlife Service, U. S. Department of Interior, with headquarters in Washington, D. C. Mr. Allen presented this paper at the Seventh Annual Meeting of the SCSA held in Buffalo, New York, October 23-25, 1952.

We can rename the "waste" areas and call them "wildlife land."

developing toward "wild vegetation" on the farm can be expressed in this way: "Leave it where you don't have to remove it."

We are dealing in terms of the farm landscape because that is the biological basis for growing a wildlife crop. It is the pattern of vegetation and other conditions on the land that decides what kinds of creatures, and how many, will live there. Most wild animals need several types of cover to make a living. They need these types properly associated for convenient use. Hence the wildlife manager is perpetually concerned with designing an environment composed of interspersed units of cropfield, grassland, marsh, brush, and woods. The more he can break such types up into units and mix them together, the better habitat he is likely to have. He wants as much "edge" as possible. It seems obvious that an area of rolling land laid out in a farming pattern on the contour has more edge and a better interspersion of vegetation types than one laid out on the forty lines. This is an encouraging feature of using a modern land-use plan as the basis for wildlife management.

Another encouraging feature is the fact that the long-term process of building soil fertility will favor wildlife in common with other products of the land. High yields of birds, mammals, and fish occur only on fertile soils and in fertile waters. The large game crops of "the good old days" were produced on the best soils of the continent when they were in a half-cleared condition. Since then, these areas have become our most intensively used agricultural lands; and their wildlife yield has greatly diminished because they are cleaned up from fence to fence and road to road.

Of course, we must be realistic about the economics of a by-product like wildlife. We certainly cannot recommend that a farmer favor it to the detriment of more valuable crops. In some areas agricultural lands are so well adapted to intensive farming that almost every square foot will yield cash income. Little, if any, wildlife management is practicable in these situations; in truck-crop areas such animals as pheasants and rabbits may be more of a nuisance than anything else.

Only a minor acreage is in this extreme condition of intensive cropping, and as we go down the scale of land productivity and value, wildlife comes into the picture. It is the so-called "waste" areas on the farm—fencerows, sapped woodland borders, swales, gullies, and steep banks—that can be used to complete the wildlife habitat pattern. We probably should re-label such spots on the farm, and call them "wildlife land." They increase in number and total acreage as we get into general farming types where the land-use capability map shows a crazy-quilt design. To project the analysis still further, in lands submarginal for agriculture, wildlife is no longer an incidental value; it becomes, with forestry, a primary land-management objective.

Sometimes we are inclined to speak rather glibly about habitat improvement for wildlife. To the amateur it must sound as though the wildlife technologist has a wide selection of well-adapted tools with which to get his job done. Let's look at some of the hard realities that face the worker in this field.

First he must base his program on what is good business for the farmer. In this connection, I recall that a few years ago there was some criticism of the Soil Conservation Service because, in the Northeast and elsewhere, their farm plans sometimes called for the removal

Square fields and bare fencerows offer least of what wildlife needs—a good mixture of vegetation types and plenty of "edge." (*SCS Photo*)

"Wild vegetation" costs nothing and is the key to our most practical kind of habitat improvement. The progressive viewpoint is "Leave it where you don't have to remove it."

of a fine, old hedgerow to make way for a new and better field pattern. This destruction of good wildlife cover was unfortunate, but likewise inevitable. The logical procedure is to take the new plan and fit into it the wildlife measures that promise to be effective and acceptable to the landowner. We can adopt it as a basic axiom that the biologist must start with a sound land-use plan and add his program to it.

Another reality to be faced by the technician is that almost nothing he does is permanent. The eastern third of the United States receives enough rainfall to support a forest vegetation. In this region almost any reasonable fertile piece of bare soil would, if undisturbed, be invaded successively by weeds, brush, and trees. The brush that is important as wildlife cover is an early successional stage, and Nature will constantly be trying to reestablish a forest vegetation in place of it. That means that someone will have to keep watch on wildlife land and do some work on it periodically if it is to be kept in the most desirable stage of development. As an example of this, in the Southeast it has been found that bicolor lespedeza plantings, which are being used widely as a source of winter quail food, will have to be maintained every three or four years, by cutting, disking, and fertilizing. This operation eliminates competition from broom sedge, seedling trees, and other plants, and stimulates the bicolor to the production of large seed crops (4).

If wildlife plantings require maintenance, how is this going to fit into the farmer's business? Will he have the interest and the incentive to invest time, labor, and perhaps money to keep his land productive for such incidental assets as songbirds, quail, and rabbits? In some places he will and in others he won't. But it is obviously necessary to develop management techniques which can be established on the land and maintained with as little investment as possible.

Which introduces what is perhaps the greatest impediment of all in this program: We are dealing with a branch of land-use ecology in which the principles probably are well established. But the details of management for a wide variety of wildlife species in many varying land types have not been worked out. The field calls for lengthy study and experimentation, yet research programs have been few in number and poorly supported. There has been nothing approaching the scale of investigation that would be necessary to provide the Soil Conservation Service with wildlife methods which could be added to their soil management measures as a part of the farm plan.

Thus, most of the things we ask the farmer to do for wildlife are aimed at the general problem of improving food and cover; but we are not especially competent in foretelling what the effort will accomplish in individual cases, and we cannot guarantee that there may not be more economical ways to get the same or better results. We hear much about the need for good demonstrations and more extension work, and this certainly is realistic;

but it would be more satisfying to promote such things if our research endeavors were more nearly adequate and were turning out the answers.

In terms of the biology of wildlife management, it is safe to conclude that it will fit into the farmer's business because it is incumbent on the technologist to make it fit. And the program can be made all the more "practical" by discovering further agricultural uses for such measures as living fences, field borders, and hedges. More experimentation with new patterns, new methods of planting, and new species of plants undoubtedly will refine such methods for all purposes.

These biological considerations are fundamental, but there is another phase of wildlife management that is important in the business of farming, and one we cannot afford to neglect. We might call it a sociological phase. It is exemplified in the attitude of some agricultural landowners in the vicinity of large cities. "I have no use for wildlife;" says the farmer, "all it does is attract trespassing hunters and multiply my troubles."

This farmer has a case that could be documented with a record of almost inconceivable vandalism that occurs each hunting season in heavily populated portions of the country. Certainly this record does not represent the average hunter. It may be the work of only one percent or less, but it is what lies behind the "No Hunting" signs that increase year to year. The sportsman who enters only by permission, realizes his responsibilities as a guest, parks his car in the dooryard, keeps his dog under control, and shows respect for property, is likely to be welcomed back again. But this respectable and lawabiding sportsman will be debarred with all the rest after the landowner has had a few experiences with left-open gates, tramped-up seedlings, cut wire, defaced signs, and injured stock. The defiant attitude of the back-fence climber seems to be a hold-over from a hundred years ago when the open spaces still were wide and game was free for the taking. My grandfather actually would have considered it ridiculous to ask another man for permission to hunt on his land.

Today property rights have a different meaning. With our tremendous growth in population we are placing a new value on privacy. We are beginning to understand the meaning of those tiny walled gardens in English towns and cities. As this nation comes to support more and more people, we can expect increasing regulation of our social relationships. We certainly can expect a growth of difficulties in a situation where a game crop that is legally regarded as public property must be grown and harvested on private land.

The solution to this seems to be for organized and responsible sportsmen to recognize that, in requesting a favor from the farmer, they will, in turn, need to help create a legal structure in which property can be protected adequately. Today there are few, if any, states where it is possible for a landowner to get help quickly and easily when he needs it. This situation was reported on in detail by Seth Gordon, now Director of Conservation in California, at the meeting of the International Association of Game, Fish and Conservation Commissioners in 1950. After a survey of 54 states and provinces, Mr. Gordon found that there were only 13 which had laws prohibiting shooting near buildings and only 11 that provided for adequate penalties in cases of property destruction or personal injury. Only five of the reports indicated that it was legal for a field officer to seize the license of a violator, and 17 stated that the administrator had no power to suspend the hunting privileges of violators (3).

Hunting and fishing are outdoor recreation for millions of Americans. As population pressures grow, the wildlife by-product of agricultural lands will play an increasingly important part in our standard of living.

This is a condition that calls for more attention by both sportsmen and landowners. There are many difficulties, but I see no solution to our "farmer-sportsman relationships" problem until we have trespass laws so stringent and so well enforced that the deeds of the hoodlum will be eliminated. That is the only sound basis on which we can operate a system of free public shooting on private land.

Progress has been far too slow, but an increased aware-

(*Continued on page 245*)

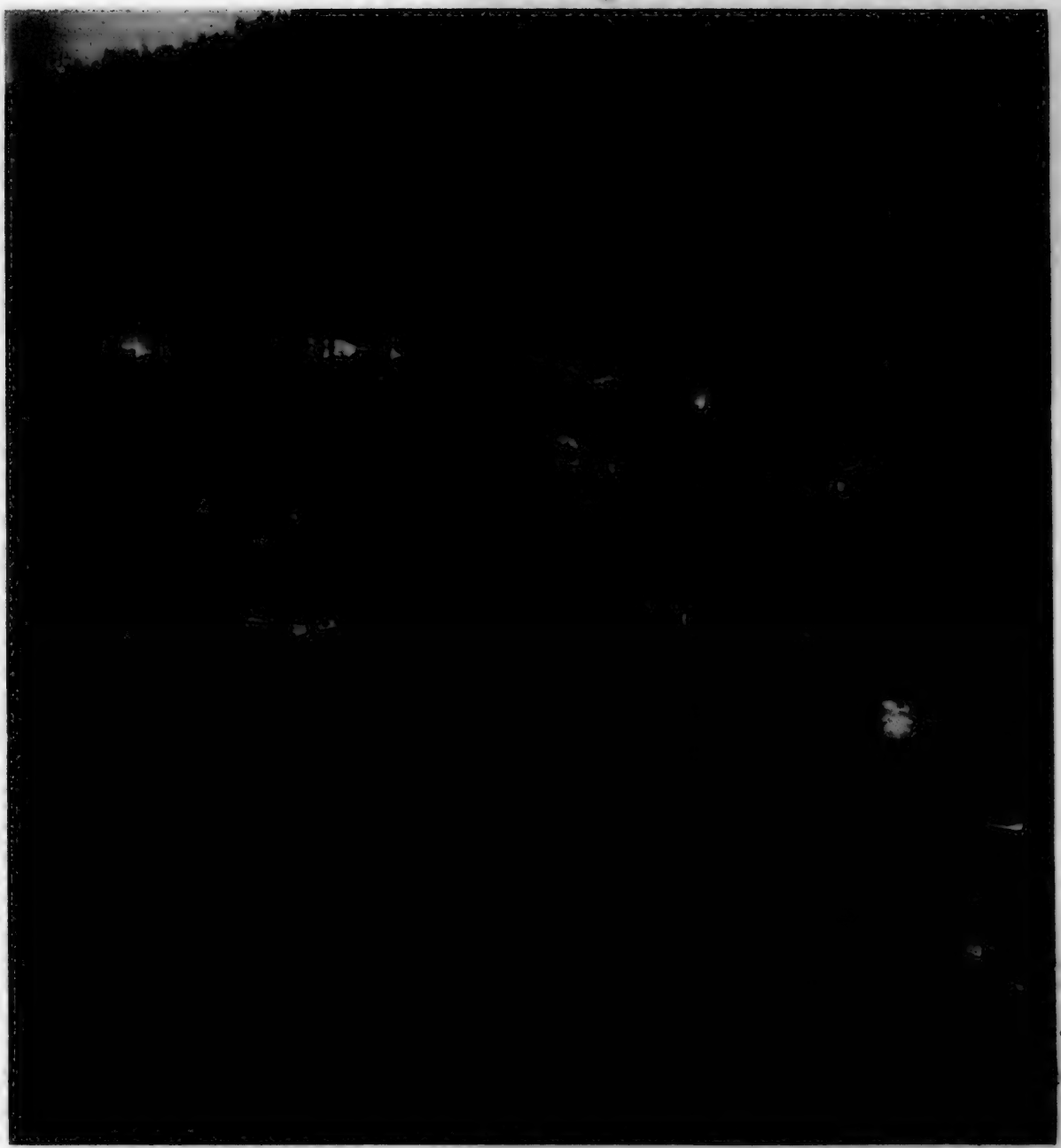


Photo by B. R. Lezen, U. S. Forest Service

This cut-over area in the Fraser Experimental Forest, Colorado, shows *alternate clear-strip cutting* of a stand of spruce-fir timber.

Terraces and strips with corn and beans on the contour near San Cristobal.

Erosion and Erosion

The Venezuelan government has in its M
servation organizations in the Americas. It is
A. Gonzalez Vale, this year received the Pan-A
ment in conservation. Within this Department
energetic, and devoted technicians who are show
rational program of land use. Although it cons
plished a great deal under extremely difficult co
Edward H. Graham, U. S. Soil Conservation S
and progress in the mountains of western Ve

Severe erosion from continuous cultivation of wheat near Mucuchies.

Broad-base terracing and contour planting of pineapples near Valera.

An arm of the great Andean Cordillera r
distance of some 300 miles. Rugged with narro
feet, snow-spotted though they lie but a few de
crops are conspicuous. Above them steep slopes
altitudes, wheat and potatoes are grown with
localities. Cattle and goats exert heavy pressure
damage the forests. As in many other parts of
growing season, heavy concentration of popula
pered, and the terrain itself compose a complica
their laws, studying social and economic conditi
problems they face.

Control in Venezuela

inistry of Agriculture one of the most promising con-
the Department of Forestry, whose Director, Manuel
merican Union award for Latin American accomplish-
is the Soil Conservation Division, staffed with trained,
ing what can be done to control erosion and apply a
sists of a small staff, this Division has already accom-
onditions. On these pages are photographs taken by
Service, in September 1952, which illustrate problems
enezuela.

Contour stone terraces with wheat and potatoes near Mucuchies.

Erosion and deposition due to overgrazing near Mucuchies.

Stone barriers and contour furrows on wheat and pasture lands near Merida.

reaches northeastward across western Venezuela for a
ow valleys, the mountains tower in places above 15,000
degrees north of the equator. At low altitudes tropical
es are burned and planted to corn and beans. At higher
planting stick and hoe the only implements in many
re on the hills, while promiscuous burning and cutting
f the world, the pattern of land ownership, a year-round
ulation in the mountains where tropical climate is tem-
cated problem. The Venezuelans, however, are changing
itions, and generally bringing science to bear on the land

Photos by Edward H. Graham

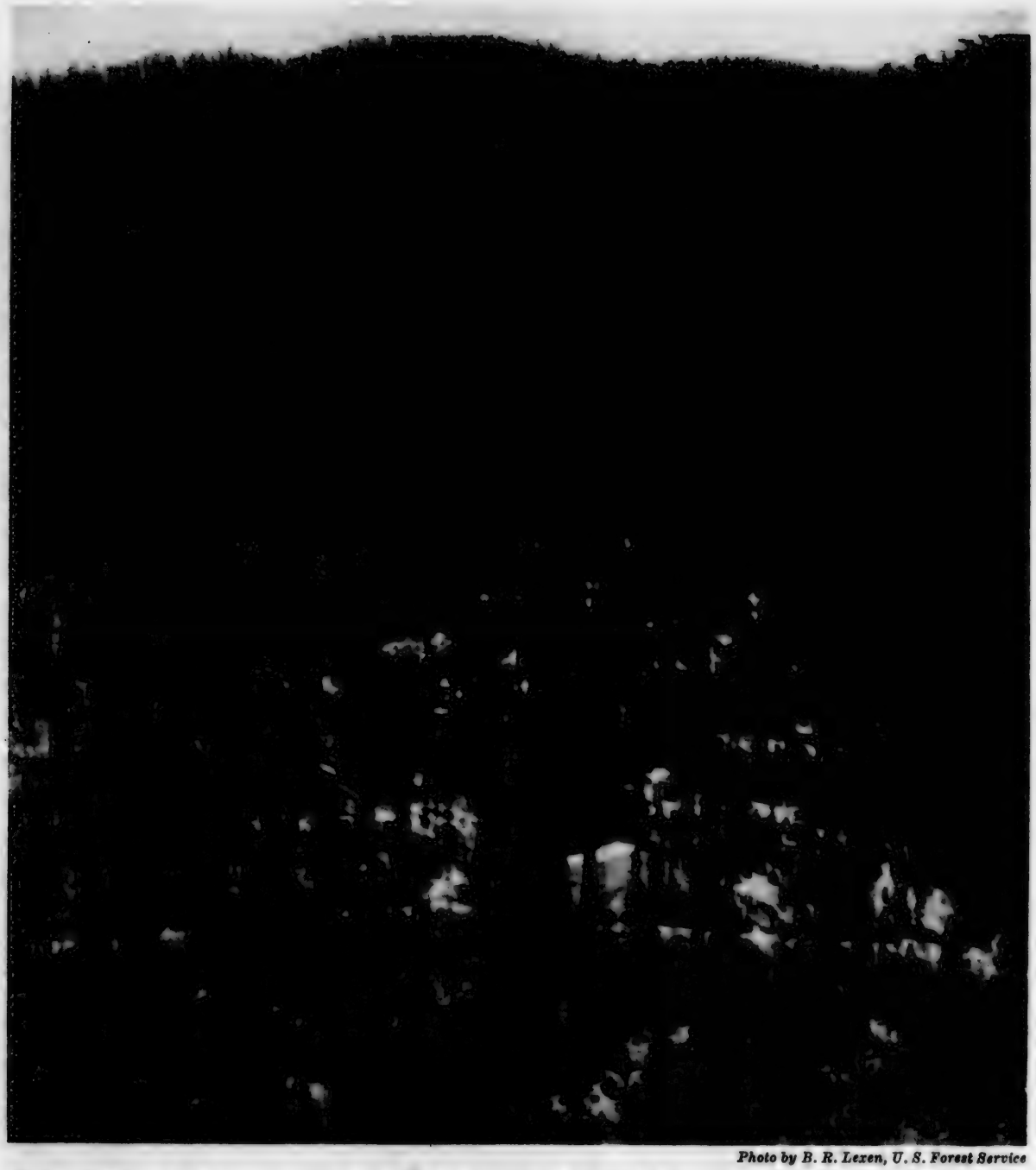


Photo by B. R. Lexen, U. S. Forest Service

An excellent example of a cut-over area showing *selection cutting* in a stand of spruce-fir timber in the Fraser Experimental Forest, Colorado.

Progress in the Little Sioux Watershed Flood Control Program

R. H. MUSSER

The Little Sioux River Watershed was authorized in the 1937 Flood Control Act, Public 406, 75th Congress, 1st Session, for survey in conformance with Public 738, passed by the 74th Congress, one year earlier.

Section 1 of Public 738 is a declaration of policy, and in part reads, ". . . . *the Federal Government should improve or participate in the improvement of navigable waters or their tributaries, including watersheds thereof, for flood control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs . . .*"

And, Section 2 assigns responsibility as follows: "*Federal investigations of watersheds and measures for runoff and waterflow retardation and soil erosion prevention on watersheds shall be under the jurisdiction of and shall be prosecuted by the Department of Agriculture under the direction of the Secretary of Agriculture . . .*"

By assignment from the Secretary of Agriculture, the Soil Conservation Service was given leadership responsibility for carrying out the field investigations and preparing the survey report. The Corps of Engineers worked closely with the Service throughout the complete investigation.

World War II delayed consideration of the Little Sioux Watershed Report. However, it was submitted to Congress and referred to the Committee on Flood Control on September 14, 1943. House Document No. 268 is the survey report, approved under Section 13, Public Law 534, of the 78th Congress, Second Session. This Congressional action is dated December 22, 1944.

In December 1945, the initial allocation of funds was made available to begin operations in the Little Sioux area.

The Little Sioux River has a drainage area of 4,502 square miles. It rises in southwest Minnesota and flows south and southwest to enter the Missouri River about half way between Sioux City and Council Bluffs, Iowa.

The loess soil material, which extends 50 to 60 miles east of the Missouri River, is representative of a large part of the Little Sioux Watershed. The upper third is in a glaciated region and contains a number of small lakes. It is in the deep loess hill area—roughly the lower two-thirds of the watershed—in which is found the deep gully and serious sheet erosion problem. These soils are highly productive and have been used largely for a corn-grain type of farming. The topography of the loess soil area varies from gently rolling in the central part to very steep in the bluffs bordering the Missouri River alluvial plain.

It is the runoff from this loess covered area of the Little Sioux that is responsible for more than a half million dollars annual damage, as estimated at the time of the survey (1940). Today those damages would be valued at about $1,250,000. They are the result of (a) discharge of floodwaters and sediment upon the rich bottomlands, (b) flood flows along the upland streams, and (c) land destruction by the formation of trench-type gullies. In addition, heavy rains which cause flood

R. H. Musser, a Charter member and first president of the SCSA, is Regional Director for the Soil Conservation Service, Upper Mississippi Region. His headquarters are in Milwaukee, Wisconsin.

This badly gullied area is scheduled for treatment. Proposed measures are indicated.

flows remove large quantities of topsoil from the uplands, resulting in a gradual deterioration of this land with accompanying reductions in crop yields.

Program is Far Reaching

The program recommended in the survey report is presented in two phases, (1) *the farm land treatment, designed to reduce flood runoff and minimize erosion on the land, and* (2) *the control of major gullies that occupy nearly every upland watercourse of the loess covered area. In the language of the survey report:*

"The proposed farm land treatment measures are directed toward increasing the proportion of the watershed protected by grass and other close-growing covers and assisting the farmers to put into effect improved agricultural practices. Both of these things will increase the amount of storm rainfall taken into the soil during flood periods and will thus reduce both flood runoff and erosion. The more important of the measures contemplated are: (a) the placing of lands too steep for cultivation under permanent protective covers such as grass and trees; (b) the use of soil and water conserving rotations, including winter cover crops; (c) the improvement, protection, and management of pastures and woodlots; and (d) supplementary measures such as terracing, contour furrowing, tree planting, refencing, gully control and waterway protection.

"To control the major gullies, it is proposed to build earth dams at strategic points and to install flumes and other structures to convey the floodwaters safely to the bottoms of the gullies. Many of these earth dams will also take the place of bridges now being maintained at great expense.

"The program described above is to be applied to that portion of the watershed lying below Clay and Osceola Counties and above the Missouri River alluvial plain. This area was divided into two main divisions for purposes of designing and evaluating the remedial program. Division A includes the upper 45 per cent of the area to be treated and is to receive farm land treatment only. In Division B both the farm land treatment measures and the major gully control works are to be installed . . ."

While the Soil Conservation Service was given the responsibility for initiating the program, we in this region definitely felt that as much of its development as possible should be placed in the hands of the local people. In the final analysis, this would be a program of the local people and they would be the major beneficiaries.

The needed land use adjustments and erosion control practices will have to be applied by the farmers on the individual farms, beginning at the top of any watershed, large or small. Once this program is applied, the maintenance would also be the responsibility of the local people.

Following allocation of the funds for initiating flood control works of improvement, the Iowa State Soil Conservation Committee held an information-type meeting in Sioux City on January 3, 1946. The committee invited all state agencies known to have interests and responsibilities in soil conservation and water management, and landowners and operators of the Little Sioux Watershed. Farmer district cooperators from the nine soil conservation districts which had been organized in the watershed at that time, members of the Farm Bureau board, county soil committeemen, (an advisory Committee to the County Farm Bureau Board, from counties not organized as Soil Conservation Districts), representatives of Iowa State College, and Soil Conservation Service representatives made up those present. The Soil Conservation Service people were there to explain the objectives of the program and to lead a discussion of the authorization, answer questions, and make suggestions with regard to getting the work under way.

One important item in the survey report provides, "*. . . . that a local agency (or agencies) acceptable to the Secretary of Agriculture, agrees to inspect, operate, repair, replace, and otherwise maintain the program after establishment.*" *The existing soil conservation districts filled that requirement and requested assistance in the way of consultation in preparing themselves to fulfill the obligation.*

The discussion brought out that there was need for one guiding group to represent all areas of the watershed. A committee was appointed which later developed into a permanent organization known as the Work

Committee. Its membership consisted of one representative from each of the 12 soil conservation districts that lie in, or partly in, the Little Sioux Watershed. There were only nine soil conservation districts organized at that time. The other three counties had representatives on the committee and were encouraged to organize districts as soon as possible. They all organized soil conservation districts within two years.

Policies are Established Locally

This committee established two important policy items early in its career which have continued to remain in force:

1. ***All landowners shall receive assistance under the same set of rules.***
2. ***Assistance under the Flood Control Authorization shall be by small watershed units. Priority for this assistance is to be developed on the basis of the percentage of the small watershed area being operated under a flood control farm conservation plan and the percent of the plan established on the land.***

To date, there have been 122 small watershed groups organized into associations by the people in those small watersheds. These watersheds have been presented for consideration by the committee. Fifty-one of them have been assigned a tentative priority classification and 47 small watershed work plans have been prepared. Final designs and specifications have been completed and 13 contracts have been let. Nine of these contracts are completed. Work is now in operation on four watersheds. Final design and specification work on ten other watersheds is in stages of completion varying from 50 to 95 per cent.

In the eight soil conservation districts lying within the authorized area, there have been established about 700 miles of terraces, involving 11,000 to 12,000 acres. About 167,000 acres have been contoured,, approximately 34,000 acres of cropland have been converted to pasture and 80,000 acres of brome-alfalfa are in rotation cropland.

In this area there are about 12,000 farms, of which 2,100 are operated by soil conservation district cooperators. Other assistance is being given to the farmers through Soil Conservation Service, Production Marketing Administration, Extension Service, Farmers Home Administration, and others.

From the beginning of the Little Sioux operation, the Soil Conservation Service has handled its part of the program within the framework of its regular organization. Requirements were met by placing technically trained personnel as determined by the job.

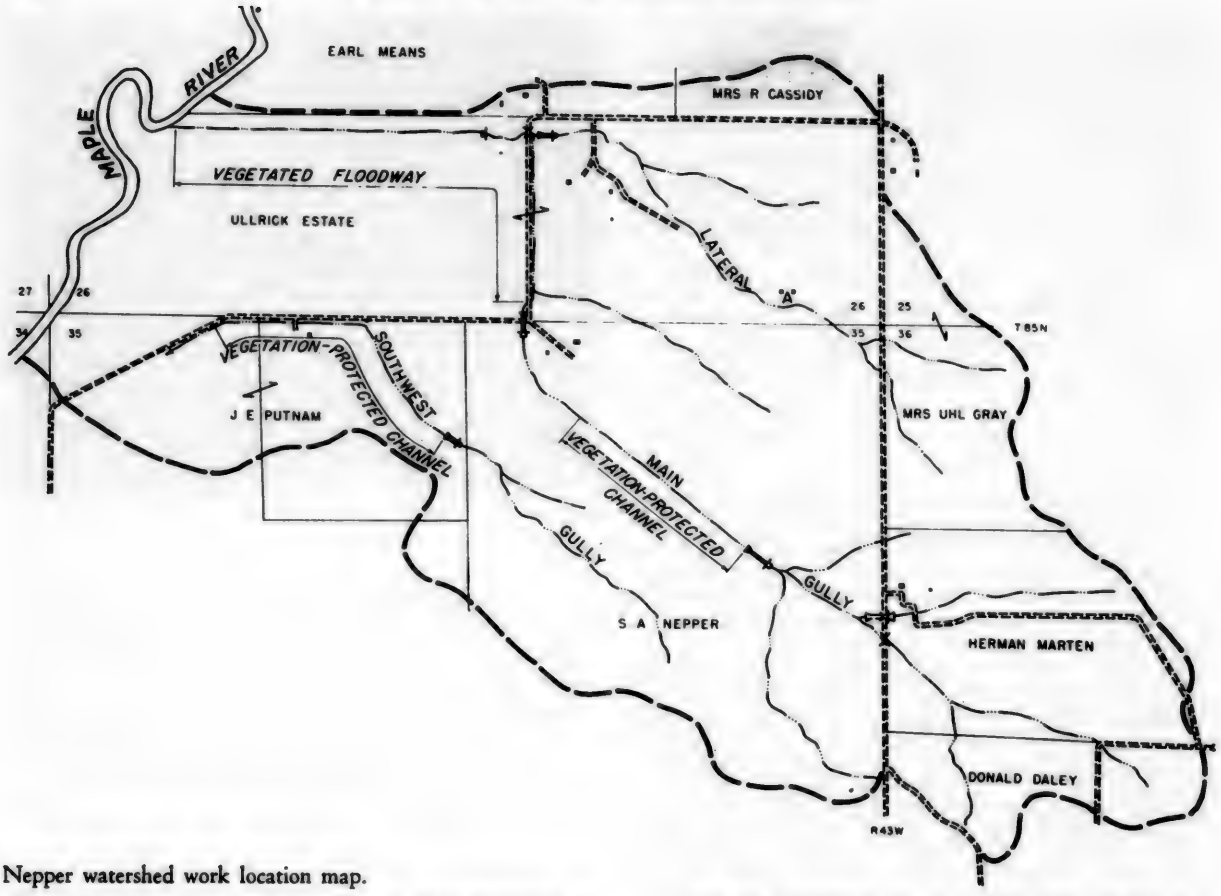
Soil Conservation Service assistance to farmers is made available through locally organized soil conservation districts. The principal part of the Little Sioux Watershed lies in one work group made up of four soil conservation districts where all the Service's activities are under the direction of the district conservationist, George Lamp.

This is one of many water retention reservoirs constructed in the Little Sioux.

Mr. Lamp's staff is made up of (1) the necessary soil conservationists, whose main objective is assisting soil conservation districts by working with individual landowners and small groups in the development of conservation farm plans in conformance with the program and work plans established by the governing body of the district; (2) soil scientists, who are responsible for soil conservation surveys; and (3) engineering specialists, hydrologists, structure designers, draftsmen, and clerks, as the job requires.

Conservation farm planning is progressing through the whole of the Little Sioux Watershed. Much of this is done through direct participation with small groups of landowners. When one or more of the groups has made considerable progress on a small watershed, the local soil conservation district member on the Little Sioux Work Committee brings the watershed to the attention of the Work Committee. More than 120 such small watersheds are now recognized by the committee.

By the time at least 70 per cent of the small watershed area is being operated under accepted farm conservation plans, (some have come in with 80 to 95 per cent), and the establishment of the work on the land is progressing as scheduled, this small watershed is again brought to the attention of the Work Committee. At this time, a complete report of progress being made by the landowners is available to the committee. This is an important step, since on the basis of this report the Work Committee may or may not establish a tentative priority for this watershed for the preparation of the flood con-



Nepper watershed work location map.

trol work plan for the watershed. A sub-committee of the Work Committee makes a personal inspection of the watershed before a priority is assigned. Upon the scheduling of this small watershed for the preparation of the work plan, Mr. Lamp, the district conservationist, is ready to assign technicians to the job. In the Little Sioux these work plans cover all phases of work that are proposed to be accomplished under contracts that call for the use of federal funds for their accomplishment.

Basically, these plans provide for the establishment of natural watercourses through a combination of vegetative and structural measures. These measures include resectioning, grading, and seeding, for grass protected waterways in addition to the structural measures required to stabilize these watercourses and provide for orderly management of run-off water.

The detailed handling of each of these small watersheds follows an established pattern:

1. ***Requests for assistance are received by the soil conservation district, either individually or in small groups.***
2. ***The landowners and operators within the watershed organize as a group and select a chairman.***
3. ***They work toward the development of conservation farm plans and initiate the application of these plans on their farm lands.***
4. ***When 70 per cent of the small watershed area is under cooperative agreement with the soil conservation district, preliminary priority is established with the Little Sioux Work Committee. After this priority is established, a sub-committee of the Work Committee visits the watershed under construction.***
5. ***Then, with 70 per cent or more of the watershed area under agreement and a showing that establishment of the farm land treatment measures is on schedule, priority for the next step is established.***
6. ***The watershed work plan is developed with the farmer landowners participating.***
7. ***The small watershed group provides sites for construction work, easements for rights-of-way.***
8. ***The initial payment toward the maintenance fund is made.***

These several steps are taken prior to the letting of contracts for construction work.

A typical example is the Nepper Watershed covering 485 acres.

By the time the Nepper Watershed was named for the preparation of a watershed work plan, 95 per cent of the area was being operated under agreement with the local soil conservation district. Land-use adjustments were being made and conservation practices, such as contour operations, terracing and field waterway protection work, were in process of establishment in conformance with the provisions of the farm conservation plans.

Additional Features are Included

In addition to the work provided for in the farm conservation plans, the Nepper Watershed Work Location Map shows the work that has been done for the purpose of: (1) watercourse stabilization and gully development control, this phase of the job to result in support of the measures on the rolling agricultural lands and elimination of this watershed's contribution to down-stream sediment problems; and (2) structures designed to temporarily retard upland runoff and conduct the runoff through the Nepper Watershed outlet into the Maple River.

These measures, in combination with the farm land treatment established on the land by the farmer-district cooperators, accomplish two principal objectives. First, the watershed is stablized for continued profitable agricultural production-on-site benefits. Second, this watershed job provides a contribution to a reduction of floodwater and sediment damage on the flood plain of the Maple River immediately downstream from the outlet of the Nepper Watershed.

The cost of doing this type of total small watershed work referred to in the Flood Control Act of 1936 is an interesting subject. This job on the Nepper Watershed is a job of "*waterflow retardation and soil erosion prevention.*"

In this watershed, the total job embraces these features in the right combination to accomplish the stated purpose:

1. Land-use adjustments as required.
2. Crop rotations designed to fit the capacity of the land.
3. Supporting practices such as contour operations and terracing to reduce and retard runoff.
4. Vegetative protected field waterways.
5. Structurally stabilized inter-farm watercourses.
6. Waterflow retarding structures.
7. One combination highway and gully head control structure.
8. A grass stabilized floodway finally leading run-off water to the Maple River.

With those items in mind, let us look at the costs:

Costs	Federal	Non-Federal	Total
Installation Costs			
Waterway Stabilization and floodwater damage	$66,606	$4,000	$70,606
Land-use adjustment	970	1,184	2,154
Total Installation Cost	$67,576	$5,184	$72,760
Annual Maintenance and Operation Costs			
Maintenance of Stabilizing and Water Management Works		673	673
Annual Operation, Land Treatment Measures		861	861
Total Annual Costs		$1,534	$ 1,534
Converting Installation Costs to average annual value, using 2.5 per cent interest rate for Federal cost and 4 per cent interest rate for Non-Federal costs, and adding these to the annual operation and maintenance cost we have:			
Average Annual Cost	$ 1,689	$1,741	$ 3,430

These costs most assuredly would never have been incurred had we not been sure of the benefits. Let's see what the benefits are estimated to be.

Benefits *(Annual)*	
Reduction in damage due to inundation by floodwater within the Nepper Watershed and downstream	$1,313
Reduction in damage due to erosion:	
Sheet erosion	1,177
Gully erosion	1,950
Sub-total	3,127
Reduction in sediment damage	125
Land enhancement (wet, brush grown on bottom areas)	272
Conservation benefits (on-site)	1,936
Total Average Annual Benefit	$6,773

Ratio—Total Annual Benefit to Total Annual Cost: 1.97 to 1.00

It is fully recognized that a part of the conservation benefits will accrue because of the contractual work done for watershed stabilization and floodwater management.

In this small watershed, 35 per cent of the conservation benefit is credited to stabilization and floodwater management phases of the total program. On this basis, the benefit-cost ratio becomes 1.61 : 1.00.

There are other small watersheds on which work has been done where the ratio of total annual benefits to total annual cost is not as high as this one, and others that are estimated to be higher.

As indicated in the Little Sioux Survey Report, it is anticipated that there will be considerable variation in

The before photo on the *left* shows the site of a proposed drop inlet structure in the Nepper Watershed. *Right.* This is an after photo showing the drop inlet structure completed.

benefits from the establishment of the program on the land. This is shown under a comparison of benefits and costs:

1. ***"The expenditure of each dollar of Public funds will produce flood benefits amounting to $1.14 in the mid-section area (Division A) and $1.43 in the lower portion of the watershed (Division B)."***
2. ***Also, "farmers will profit by cooperating in this program; as in Division A they will receive $2.52 for each dollar they invest, and in Division B, $1.92."***

Maintenance of Projects

Each unit of the program established on these small watersheds is a necessary portion of the combination of measures required for the stabilization of the watershed and to provide a reduction in damages downstream.

It is not sufficient to simply install the program—it must be maintained over the years to provide the accumulation of benefits.

Each group of owners of the watershed land provides assurance to the local soil conservation district officers that this maintenance will be provided.

Before Federal funds are expended for construction work, the watershed group establishes an initial fund for maintenance. This fund is three per cent (3 per cent) of the estimated contract cost, or a maximum of $1.00 per acre.

To assure a continuing source of maintenance funds, the small watershed group further provides one-half of one per cent of the estimated cost of the construction work each year for a period of 15 years. These maintenance agreements are covered by the required legal documents, properly recorded.

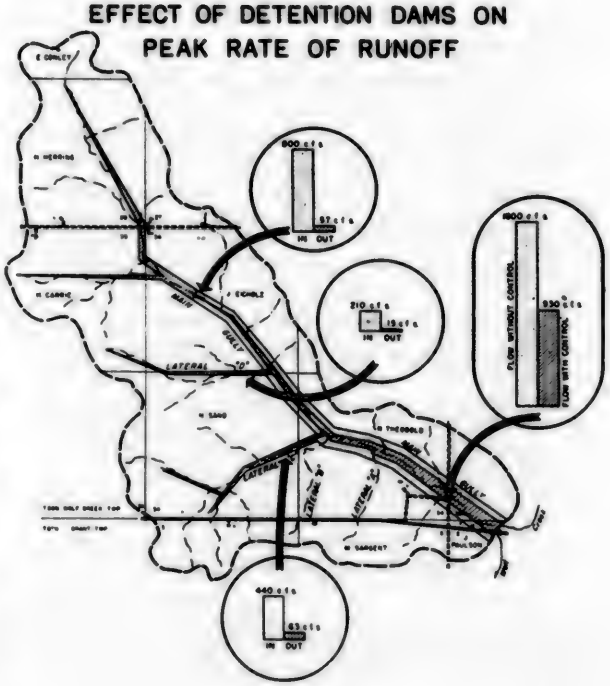
A second source of maintenance assurance is available. The Iowa Legislature provided the necessary legal process under which a county board of supervisors may assume the maintenance of projects such as these in which Federal funds are used. This responsibility has been assumed in the Soldier-Maple Valley Soil Conservation District.

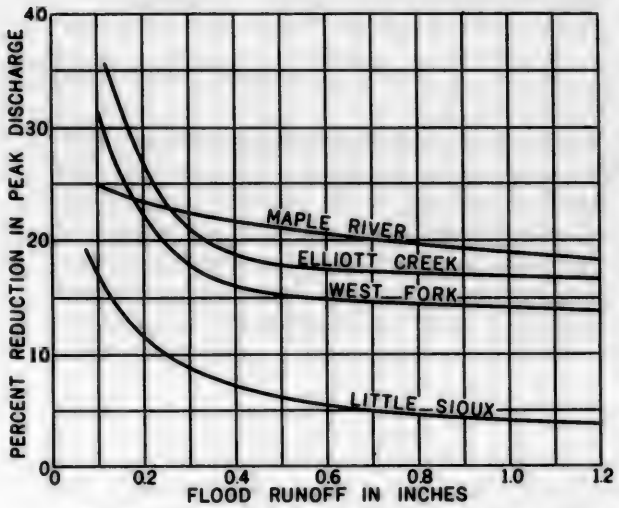
Water-flow Retardation

One of our important responsibilities in working on these flood control jobs is to delay rapid delivery of runoff water to major stream channels.

Soil Conservation Service hydrologists estimated that the establishment of the program would result in flood reductions of this order.

(1) On the Maple River: A flood runoff of 1.0 inch without the program would be reduced by 18 per cent with the proposed program in effect.





(2) The reduction on other tributaries is estimated to be:

Elliott Creek	— about 16 per cent
West Fork	— about 14 per cent
For the Little Sioux Watershed	— 4 per cent

Another small watershed on which we have completed the flood operations work is the Theobold Watershed, covering 861 acres. The pictorial graph shows the retarding effect of the combination of four floodwater detention structures.

(1) At the upper point on the main channel, a peak inflow to the reservoir of 800 cubic feet per second is reduced to an outflow of 57 c.f.s.

(2) On a similar tributary, a peak inflow of 210 cubic feet per second is reduced to 15 c.f.s.

(3) On another lateral the inflow to a detention reservoir of 440 cubic feet per second is reduced to an outflow of 63 c.f.s.

(4) At the lower extremity of the Theobold Watershed with a peak flow of 1,800 cubic feet per second arriving, floodwaters are delivered to Wolf Creek at no more than 930 cubic feet per second.

A Social Phase to the Conservation Task

(*Continued from page 242*)

the number of farm plans completed have increased in concentration, particularly in school district No. 1 and school district No. 2.

Summary

The contention of this paper has been that the true end-point of conservation programs is the development of conservationists, and that the major criterion for success is the extent to which a permanent attitude of understanding results and a belief in the rightness of conservation is secured. This conservation end-point cannot happen until conservation is viewed as normal, everyday behavior. To accomplish the task demands that the everyday patterns of life in the countryside be ascertained, especially the group life and its attending sentiments and beliefs. A constant attention to developing true conservationists, girded by deepend values and beliefs in the applications which they make, will render it unnnecessary that the ends of conservation be promoted by arbitrary rewards, subsidies, and agrarian particularism. Instead, these ends may be attained and maintained by the insistence of the people, for American purposes and by, essentially, American ways.

NOTES AND LITERATURE CITED

1. A. C. Bunce, *Economics of Soil Conservation*, Iowa State College Press, Ames, 1942, p. 1.
2. C. R. VanHise, *The Conservation of Natural Resources in the United States*, The Macmillan Co., New York, 1910, p. 379.
3. C. E. Lively, *Some Social Aspects of Forest Conservation*, Pamphlet of University of Missouri, Columbia, 1951, pp. 2-3.
4. E. Hartnett, "Conservation Education in the Public Schools," *Journal of Soil and Water Conservation*, 5:1, 1950, p. 16.
5. Professors C. E. Sower, J. B. Holland, W. E. Freeman, P. A. Miller, and others of Michigan State College have studied the importance of the convergence of interests in the total process of community action and organization.
6. The name of Crossroads is a synonym in order to maintain anonymity.

"I am a zealous believer in conservation, both as a national policy and as a personal creed. I have seen first hand in many parts of the world what soil and fertility losses can do to civilizations. I have crossed great deserts that once were fertile granaries—now laid waste because man wasn't intelligent enough, or didn't care enough, to preserve his soil.

"To build a strong, secure United States we must save our soil—and improve our soil. We aren't now doing the job fast enough or well enough . . .

"The Soil Conservation Service is a competent technical agency that makes its know-how available to farmers in locally-organized, farmer-run Soil Conservation Districts. It comes into the Districts to help farmers only at their invitation . . .

"I strongly favor farmer-managed Soil Conservation Districts, with the Soil Conservation Service and other public agencies giving such help as farmers request."

—DWIGHT D. EISENHOWER

A Social Phase to the Conservation Task

PAUL A. MILLER

This paper concerns an assumption that the people, both rural and urban, are the true end-points of the conservation task. The author believes that this will occur when we hold the "requirement of a permanent attitude of understanding, a belief in the rightness of, and the endurance of a human value regarding conservation that becomes, in due course, a fragment of the cultural heritage." The required process is one of re-education, or the wise application of mass education, the development of interest, the convergence of interests within American groups, and the stage of practice; for re-education calls for "a redefinition of the conservation problem and the innovation of a new technique which, if practiced, will become a prescribed, a right, and a traditional way of behavior."

SOCIAL SCIENTISTS with a concern for the conservation of land and water resources have constantly remarked, *"Just what is the interest of a social scientist in the broad field of conservation?"* In the viewpoint of the author, it is in that question and in the answer, both dealing with people and regardless of who is involved in the question and the answer, that many implications lie for the future of conservation.

The first days of the conservation movement entertained a variety of ideas, which many would say were "looking at the social side of conservation." Any student of conservation history repeatedly encounters such references as "social improvement," "justice," and "social exploitation." A. C. Bunce states, "The early conservation movement . . . . apparently collapsed because of its vague and credulous opinions. In many ways it became a moral issue. To many, the term conservation became a synonym for the good life . . . ."[1] Note, too, the definition of Van Hise, "Conservation means the greatest good to the greatest number . . . . and that for the longest time."[2] Needless to say, today's social scientists look for a more definitive treatment on the matter of conservation.

Since that day, the conservation path has become a long, and in so many respects, a fruitful path. There is a steady flow of reports, many of which deal with technical aspects of conservation application that were unknown at an earlier date. Conservation is now explained by the mysteries of supply and demand curves, combinations of production factors, firm equilibrium analysis, definitions of the farmer as an entrepreneur, the farm as a firm, and the decision-making functions related to both in rendering a control of land and water use. Certainly, a splendid start has been made toward an economic phase of conservation, and this effort should be continually encouraged.

Yet the social scientist assumes that the entrepreneur is an agent of the total society and of the public welfare. The entrepreneur has a temporary charge; the society has a permanent one and is concerned in the long run. But, at this point, one can easily be mired in all sorts of "time-preference" theories in relating the individual to society and to some future generation, with which, we trust, we may be able to do a better job of education. But, for at least one social scientist, social costs are great for the present. A reduction in total soil capacity has something to do with total productivity. The presence of flood conditions, silted harbors, rivers, and reservoirs make for repeated social costs. Even the shifting of individual costs and risk-bearing to society may give flexibility to the entrepreneur, but social costs are not decreased in the present.

The purpose of the previous comments is not to set the stage for a sweeping exposition on conservation amidst the great crucible of American society. Rather, the purpose is to make a first point, namely, that no longer is it possible to view conservation as an independent, free-floating problem, for, indeed, it must be couched in the framework of the great society, or in the interrelationships of tenancy, credit, subsidies, production, education, research, the quest for a sound policy of family farming, and an enlightened public at the crossroads and in the metropolitan centers of the land. Our aspirations for conservation improvement must not be inherently rural, nor inherently urban. They must be inherently American and the human community in which our aspirations rest recognizes few lines of separation and few separate camps; for the prime social product is people.

Conservation End-points

The intended theme of this paper concerns the end-

Paul A. Miller, a member of the SCSA and Extension Rural Sociologist at Michigan State College, presented this paper at the Annual Meeting of the West Virginia Chapter of the Soil Conservation Society of America. The paper was slightly revised for JOURNAL *publication.*

point of soil conservation district and all other programs that blend the best we know in the pursuit of applying conservation on the land. This end-point, this paper submits, is that of assisting people to become conservationists. "Complete farm plans," "terraces," "strip-cropping," "soil capabilities," and "technical assistance" are only some of those ideas or tools which help us to achieve whatever ends we have in conservation. The contention of this paper is that helping people to become conservationists cannot be achieved until conserving soil and water and forests, and all those resources to which we direct ourselves, becomes normal human behavior.

When the author visits with District cooperators, he is prone to ask himself, *"Has the district gone beyond the applications of skills and techniques, and has it met the final test of assisting conservation to become an acceptable belief, valued as a way of living?"* For the author the present quest of conservationists is for that performance in conservation practice which is stimulated according to standards that, in themselves, become traditional and right, and which will bring the rewards due every human conduct which is prescribed to by the majority of the society. We can aspire to no less, added to sufficient conservation skills, than the requirement of a permanent attitude of understanding, a belief in the rightness of, and the endurance of a human value regarding conservation that becomes, in due course, a fragment of the cultural heritage. This is the fundamental notion upon which the case for a social phase of conservation must rest. As a great people, we Americans have yet to meet this requirement and to render unto ourselves this caliber of performance, for as C. E. Lively states, "(Our historical belief was that) the resources of this country were inexhaustible. . . . believed, with the *laissez faire* economists, that the public good was served best by everyone serving his own interest." This author believes that this history led to, ". . . . attitudes and beliefs (which) set the pattern for the most astounding and destructive exploitation of natural resources that the world has ever seen."[3]

Dimensions to a Social Phase

Rather than having this statement appear as a continuing pronouncement, the following analysis, instead, presents certain basic social facts, each and all of which may either help the conservation movement, or hinder it. First of all, in conservation and in all other forms of behavior, human beliefs and values determine the actions of the individual only if group members share them. One's manner of dress, his food, his house, and his words —are all fixed by the groups to which he belongs. Here we have his society, first of all, his family, his occupational group, his fraternal group; and eventually his neighbor across the fence. The point is merely that the end-point of conservation work, of developing people as conservationists, must encounter, somewhere in the process, that conservation as a value and a belief must be tempered in the fire of human groups.

The group is a distinguishing and fundamental aspect of all human life, and this is true from the most primitive tribe to modern man. The countryside, the factory, and the city street all function, in part, because humans can understand a common language and can combine into groups by which common needs may be served. Meeting the needs of living demands that the individual be able to predict the actions of his fellows; there must be some semblance of order. Predictability grows from the rights, the duties, and the obligations possessed by each individual and, similarly, the rights, duties, and obligations of the others. The group thrives because its members share a body of expectations, one to another. The rightness of these expectations, as determined by all members of the group, forms a common sentiment that may prevail, as in every family, after the members may no longer be physically together.

There are certain other essentials about the group which conservationists may find useful in their programs. The group is formed about some need to which the interests of the members may be turned. The rearing of children, the mutual aid of the threshing ring, or the purpose of the Artificial Breeders Association are but examples. Next, the group will have prescribed ways of going about meeting the needs, for there are right ways and wrong ways to accomplish the purpose, although the need may be a simple one. The members soon learn the normal ways to go about the group task.

The meeting of group needs depends on a collection of skills and materials. Every group will have a technology, for example, its plows and plowing skills, its livestock and feeding skills. These skills and materials are, in themselves, assumed to be normal and natural and will, in due course, become traditional. For instance, the reluctance to change some patterns of farming follows on a *group-formed* and *group-accepted* technology which is not easily discarded until something new is proved to be more acceptable.

Finally, the group will have an organization of its members. Just as the family assumes a father and mother, so does every group require some arrangement of its participating members. It is here that different ones may exercise different influences on the others and a division of labor will occur around certain members as leaders. Expectations and duties regarding men and women, the young and the old, will vary. Even the most informal group will achieve some classification of its members.

The previous remarks may seem, to some, as the excessive preoccupation of the author with the ideas espoused by his own discipline. Yet they have been cited relative to the present contention that an interest in working with these fundamental truths will condition the manner in which the idea of conservation shall be placed in the normal patterns of life in the countryside; for the author must believe that it is the people, not professional conservationists nor the epistles and mandates of their agencies, who must ultimately decide whether conservation becomes a belief or remains at the level of a technique. The above notions have to do not so much with education as ordinarily conceived, but with *re-education;* for this, in the author's opinion, is the task of the conservation movement today.

The Re-education Process

The important social phase of the conservation task today is that of building on both the prevailing and potential relationships and sentiments of American groups —large and small, formal and informal, rural and urban —through a redefinition of the conservation problem and the innovation of a new technique which, if practiced, will become a prescribed, a right, and a traditional way of behavior. The purpose of the remarks to follow is to view the dynamics of the process by which the conservation end-point may be reached.

The *first step* is that the sentiments, the emotions, of the people must become aroused over the matter of conservation. Overall conservation planning has largely left, in the author's view, to general education the problem of stimulating the urges and sentiments of the mass society toward conservation. This, perhaps, is as it should be. Yet, in discussions with conservationists, the author learns that the conservation task is only on the verge of forceful educational work in conservation as it applies both to public school education and the offerings for adults. A recent author in the JOURNAL OF SOIL AND WATER CONSERVATION states: "*Too many educators have in the past been setting up a curriculum for children and telling them here it is, these are the things you must know, 'come and get it,' and then they have stood in front of the room . . . . and dared the child to think. I am sorry to say we still have some of this ridiculous type of teaching going on in some of our public schools and also in some of our colleges.*"[4] The emphasis of the present paper is that mass education, with intelligent planning to keep pace with the times, is the necessary first step in re-defining conservation as a value and a belief; for it is in the great receptacle of mass education that generalized conservation problems are formulated, needs are sharpened, present technology is seen as insufficient, and new practices are compared with the old.

Once the exposure to mass educational facts strikes the sentiments of, let us, say, the individual farmer, a *second stage* in the process must occur. This stage is simply that of producing, not only feelings or emotions, but a *positive interest.* The pre-planning activities in Soil Conservation District programs frequently fulfill this function. The *third stage* in the process is a crucial one if the conservation idea is to be fused into the group life of the people. This may be called the *convergence of interests.*[5] There is, in the author's view, no other step in American adult education which has been so overlooked, escaped from, and refused, as this one. The process of converging interests will not take place unless the idea of conservation gains approval by the groups in which the individual finds himself. Every group will have its own way of determining what is an approved procedure and what is not.

But a convergence of interest on the part of group members is not the final step in the process; for the redefinition of the conservation problem will not occur until the stage of *practice.* Two fundamental tenets in a theory of learning relate to the stage of practice. One is that the learning process must provide the individual with the opportunity of viewing his farm and his problem from the vantage point of other persons—neighbors, conservationists, and all the other active ones in the arena of conservation. Neighbor group conservation planning, discussed and applied in recent years, makes a major contribution at this point, for it provides an opportunity for cooperators to look at their own farms and at their conservation behavior from the position of every other member of the neighbor group. Another tenet is that little enduring learning occurs without verbal interaction, or just plain talking. Again, neighbor group planning contributes to this point, in that a sort of verbal environment is provided through which the participating farmer undergoes a type of experience which results in an increased ability to combine and re-combine ideas about conservation into patterns which fit not only his own farm but those of his neighbors, those of the community, and of his country.

There are a number of handicaps to the task of transfusing conservation ideas into the group life of the people and, to this extent, prevent "conserving" from becoming normal behavior. First of all, there is the conservationist, himself. The personal image which the conservationist invokes on the part of the people, his confidence and skills of working with large and small groups, and his tenacity for the end-points of his work—all these are important factors.

A second handicap is the frequent variation between

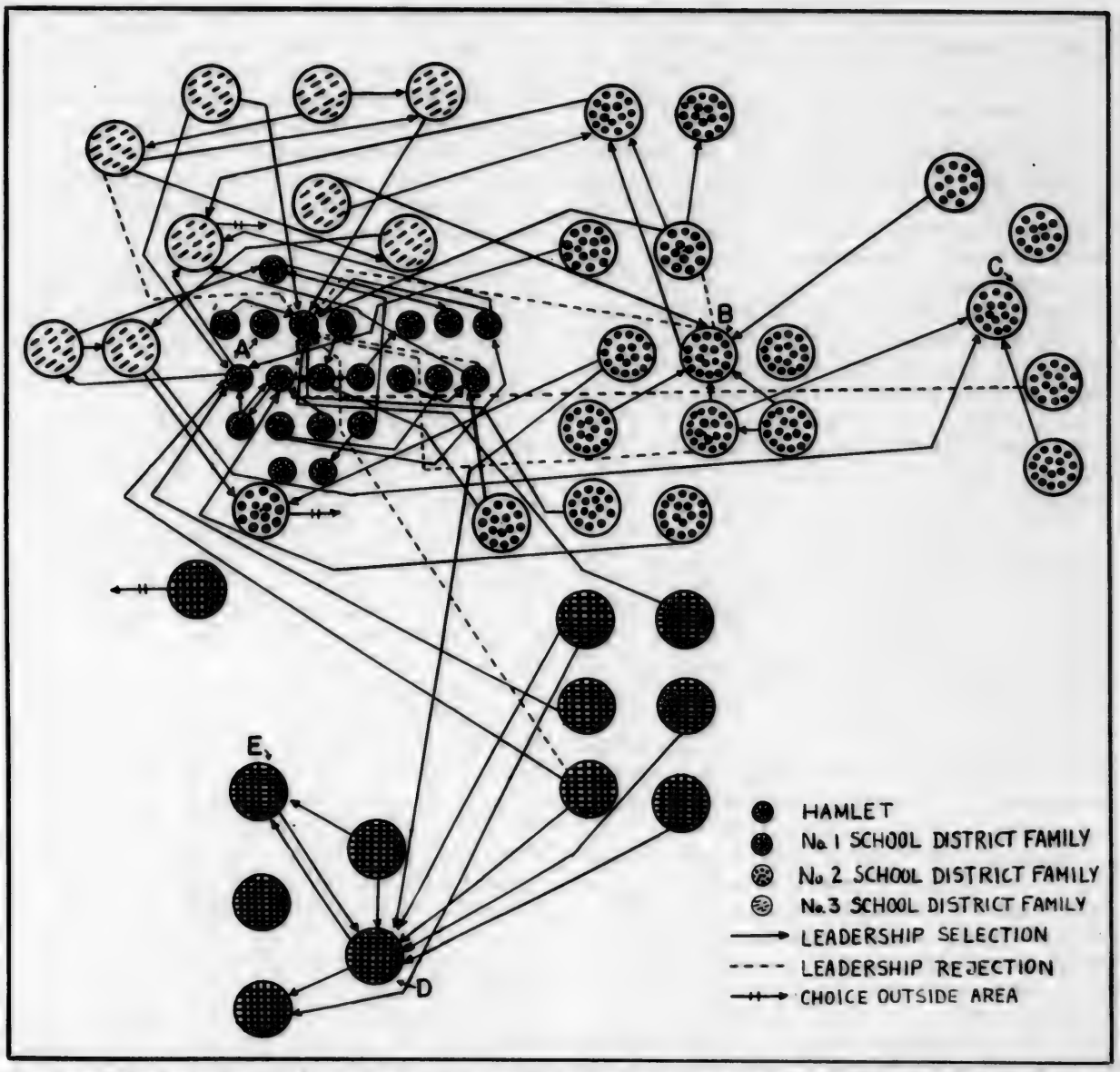


Figure 1.—The circles represent families in approximate geographical relationship to each other. The size and shading of the circles indicate whether a family is resident in the hamlet or open-country residents in one of the three school districts in the community. The solid arrows represent *selections* of leaders; the broken lines represent spontaneous *rejections* (that is the rejections were given by informants without being asked for by the researcher). It should be noted that family A is selected largely by hamlet families and rejected by some open-country families; that families B, C, and D are selected as leaders in two neighbor groups roughly coterminous with school districts. Family A had been the initiating leader for many rural programs.

and among the human populations with which the conservationist deals: Sheer differences in age, type of farming, nationality and residence backgrounds, religious affiliations, and the extent and quality of local leadership in the groups which conservationists serve.

A third handicap is the variation in local social situations due, largely, to the impact of the industrial revolution. Every farmstead in America has been struck by, as some would term, the "money economy." Modern forms of transportation and communication, and the modern exodus of the metropolitan populations to the hinterlands, have produced a series of farmer types: the commercial farmer, the part-time farmer, the subsistence farmer, and many others. These great social changes are cited in that they encourage frequent variation in the aspirations of the people toward conservation. The au-

thor must emphasize that such changes make any approach to the individual *without* relating him to the larger society a questionable and dubious venture.

The Case of Crossroads, Michigan

In order to illustrate a few of the ideas presented heretofore, the case of one rural community in Michigan may serve the purpose. Crossroads, Michigan, contains four basic units. First of all, the small hamlet of Crossroads, which serves as a secondary trading center for the surrounding countryside, is the residence of some 20 to 25 families. The other three units are the primary school districts, the boundaries of each enclosing ten to twenty open-country farm families. The services provided by the hamlet of Crossroads are a Methodist Church with a low membership, largely from the hamlet, itself; two grocery stores, a hardware store, a farm implement store, a garage, a gasoline station, and a feed mill. Of the three school districts, one of which includes the residents in the hamlet, only one is operating, the other two districts transporting pupils to larger school systems, especially to the county seat town a few miles south of Crossroads. The attraction of larger trading centers for the people in Crossroads is amply illustrated by shopping and recreational shifts to larger centers, and the transfer of organizational memberships, including religious memberships, to the larger towns in the vicinity. The total situation for Crossroads may be summarized by stating that its community solidarity is increasingly disintegrated by the migration of services from the local area to larger and more complete centers.

Professional county workers reported three years ago that the development of rural programs, among them conservation, was retarded in the community of Crossroads. Such programs, once initiated, were reported to quickly wither with the lack of continued enthusiasm and support. At the time of the study the entire community was involved in a conflict over the single operating school. This conflict focused on the matter of salary for a teacher, and had caused a delay in the opening of the fall school term. An explanation for this conflict, which was but one in a succession of community conflicts, may reveal the manner in which the social factors discussed earlier converged in a way to impede the progress of conservation programs and, likewise, to set the stage for a more realistic approach to conservation planning and practice.

The community-wide leader, as considered by many county professional workers, was the head of family A (Figure 1), a resident of the hamlet but the owner of three farms in the surrounding countryside. He was the presiding officer in local church affairs, a member of the school board, and the former head of a small bank in the community prior to 1932. Reference to Figure 1 will reveal that the spontaneous *rejections* of leadership by open-country rural families were largely directed at A, while leadership choices gained by him were, for the most part, confined to the hamlet proper. The images cast by the bulk of open-country residents of A revealed a community sentiment which was violently negative. This, of course, was a revelation in view of the fact that it had been A who had been the initiating leader in many community programs, which had so often, and so quickly, died. These negative sentiments were related to such illustrative images as *"has always run the community," "dictates to the church," "brings the wrong kind of tenants to his farm," "has killed more programs than he has helped."*

The positive leadership choices made by open-country families in Crossroads were directed to certain families within overall neighbor groups which tended to live within the geographical territory of the school districts. Reference to Figure 1 will show that the heads of families B, C, and D were so chosen. These latter families had not been active in agricultural program development but were viewed as *"good neighbors," "sound people," "interested in their neighborhood," "always going out of their way to help someone."*

On these and other data a set of three recommendations to conservationists followed. The basic social factors employed in developing the recommendations were the disintegration of the entire community as larger centers increasingly exerted an attraction on the residents, the institutionalized social structure of the community (a part of which is the leadership pattern) impinged upon by a rapidly changing countryside, and the resulting opportunities for divisiveness and conflict as major determinants in the community. The first recommendation was that the total community of Crossroads be no longer considered a social unit (or group) for the introduction of conservation programs. A second recommendation concerned the need to overlook the hamlet, and its contained leadership, as being relevant to the conservation task. The third recommendation was to attempt an introduction of conservation, by means of neighbor group planning, into the two groups found, respectively, in school district No. 1 and school district No. 2, and that families B, C, and D be encouraged to become, informally, the representatives of the conservation program among their neighbors.

Since the time of the study, family D has moved to another state, but early stages of group planning have shifted to family E; the groundwork for neighbor group planning has been developed in school district 2, with family C exhibiting a positive conservation interest; and

(*Continued on page* 237)

The Story of Two Watersheds

JOHN A. ALLIS

The tragic floods on the Kansas River in July, 1951, which have been called the nation's worst to date, are a challenge not only to engineers but to the farmers. The farmers can control to some extent the water which contributes to floods. This was shown by a group of five farmers of an upper watershed of the 60,000 square mile river basin. What was measured there concerns the effects of conservation on tributary streamflow.

THESE FARMERS are located on the East Fork of Beaver Creek. This stream in south-central Nebraska, about 25 miles south of Hastings, contributed water to the Kansas flood just as did many other tributaries. There was, however, a difference in the amounts of water contributed to the floods and the manner in which it left the land on a 481-acre watershed (W-3) at the headwaters of the West Fork of Beaver Creek and a 411-acre watershed (W-5) at the headwaters of the East Fork of Beaver Creek.

These two small watersheds were selected for study in 1938 by Soil Conservation Service Research to determine the effect of a well-planned conservation program on the amount and rate of runoff. The areas are typical of much of the central Great Plains and were selected after detailed examination showed their physical features and soils to be comparable. Then followed six years of recording of rainfall and rainfall intensities, and measurements of the flow of runoff water at gaging stations below each area.

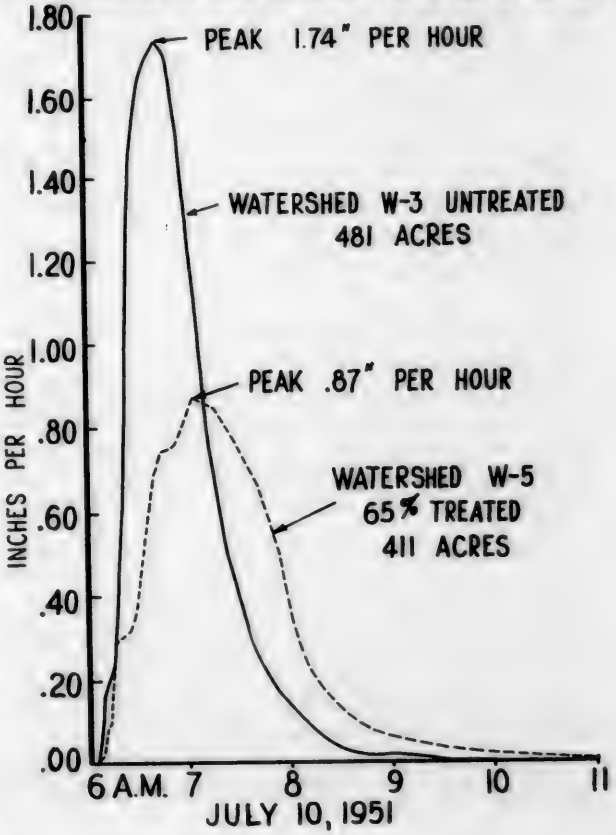
These studies further showed the two watersheds to be comparable because of their similar physical characteristics. When the rainfall was comparable, so were the peak rates and total amounts of runoff while both were farmed in straight rows.

Since 1947, five farmers who have land in the 411-acre watershed at the headwaters of the East Fork have been cooperating with the Soil Conservation Service. They have established grassed waterways, built 65 per cent of the terraces planned for the watershed, farmed on the contour, and make a start on a soil-conserving and soil-building crop rotation. This conservation work is similar to that being done by farmers and ranchers in cooperation with soil conservation districts all over the country. None of the special measures designed especially for flood control, such as detention dams, often called "dry dams," are included. As one farmer in the watershed applied no conservation measures, the whole area is considered to be only partially treated.

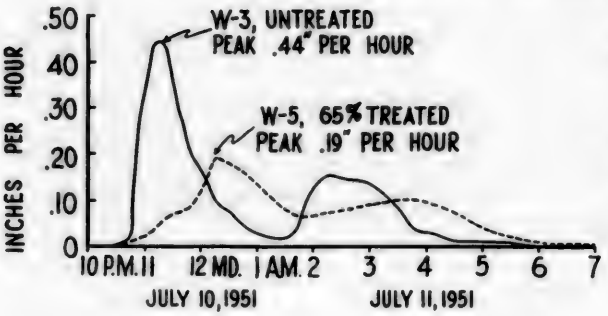
Farming operations on the 481-acre tract at the headwaters of the West Fork have not changed during the period of study.

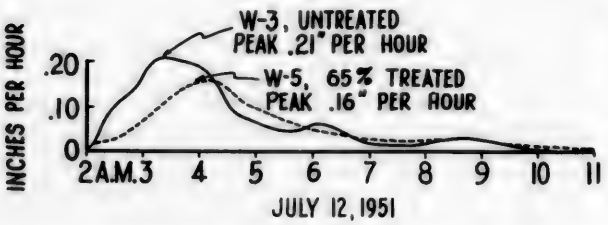
The flood on these two watersheds was part of the general flood that came as a climax to a series of rains in June, 1951, topped by heavy rains in the basin from July 10-12, 1951. This flood was the result of several successive storms.

First, let us review the June records. Rainfall in June was approximately six inches, or over 250 per cent, above the long-time average. The unprotected watershed received 9.71 inches as compared with 10.52 inches on the somewhat smaller partially protected watershed. Runoff measurements showed that the unprotected watershed retained 5.4 inches of this rainfall. On the partly protected watershed, 6.7 inches was held on the land. In other words, in June the partly protected watershed absorbed 1.3 inches more rainfall. That amounts to 35,300 gallons per acre, or enough to fill six of the big



John A. Allis is Project Supervisor, Central Great Plains Experimental Watershed, Soil Conservation Service Research. His headquarters are at Hastings, Nebraska.





gasoline transport semi-trailers you often meet on the highways. The soil was well supplied with moisture.

Then came the rains of July 10, 11 and 12. The storm in the morning of July 10 dumped 2.66 inches on the unprotected watershed and 2.84 inches on the partly protected watershed in a three-hour period between five and eight o'clock. One and one-third inches of rain fell in about nine hours, starting at 5 p.m., July 10. A seven-hour early morning rain on July 12 deposited another inch of rain on the two watersheds.

Rainfall on the unprotected watershed during the July 10-12 period was 5.04 inches, of which only 2.0 inches was retained on the land. On the partly protected watershed, the rainfall was 5.14 inches, but 2.6 inches were retained. The additional water saved, equal to 20.5 acre feet, would have filled three of the larger farm ponds of an average surface area of two acres to an average depth of 3.4 feet.

The runoff during the June 1 to July 9 and July 10-12 periods on the unprotected watershed was 44 and 60 per cent, respectively. In comparison the runoff from the partly protected watershed was 36 and 49 per cent, respectively.

Runoff charts for the July 10-12 rains show that virtually all of the runoff from the unprotected watershed after the rains on the morning of July 10, which lasted from 5 a.m. to 8 a.m. passed the gaging station in the two-hour period of six to eight o'clock. The flow rose to its peak rapidly and fell off just as rapidly. Runoff after eight o'clock was only a trickle.

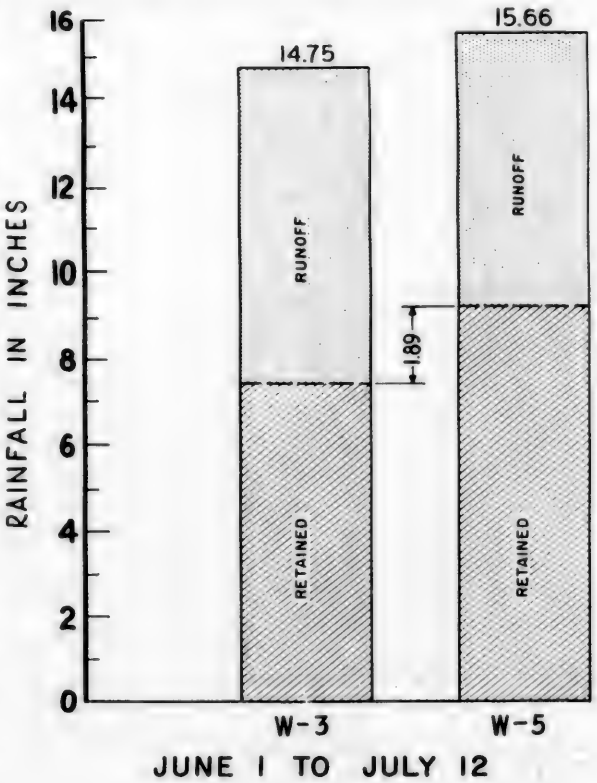
In contrast, the runoff from the partly protected watershed came in a much more orderly manner. It didn't reach its peak flow until most of the runoff had gone from the other watershed, and the peak flow was only half as high. It took three hours for the bulk of the runoff from the partly protected watershed to pass the gaging station compared with two hours on the other.

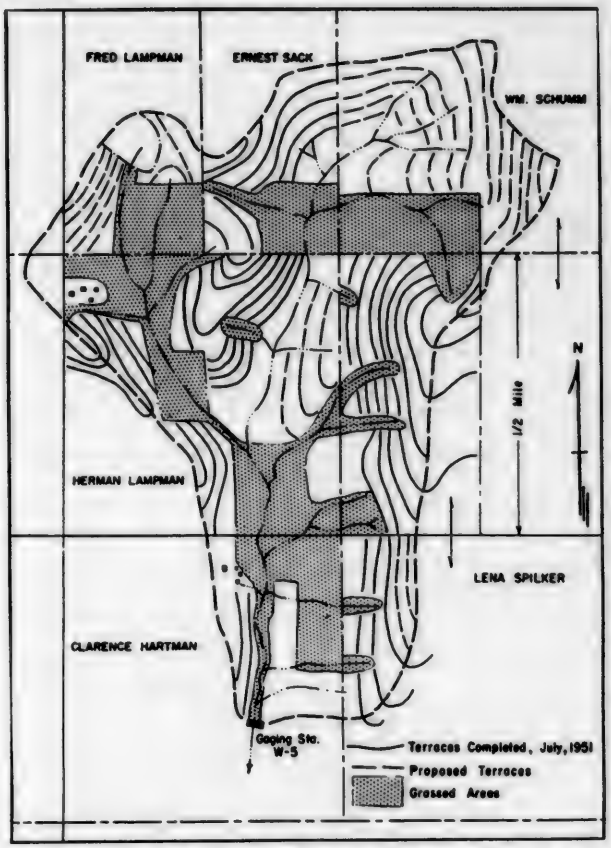
The runoff pattern for the other two rains was about the same except that, since less rain fell, peak flows were not so high, and the runoff from the third and smallest rain extended for about the same length of time on both watersheds.

The total amount of water saved was 1.89 inches more on the partly protected than on the unprotected watershed for the entire six-week period, June 1 to July 12, 1951, or enough to fill 11 farm ponds each about one city block in size to an average depth of 3½ feet.

The results on these watersheds fail to tell, for the present at least, the whole story about the effects of complete soil and water conservation on the amounts and rate of runoff.

In the first place, some of the conservation measures of proved effectiveness in increasing the rate of infiltration of water into the soil, particularly subsurface tillage on upland and a grass-legume mixture in the crop rotation, were not used. Some evidence of the effectiveness of these measures, however, is provided





65 per cent of this watershed is treated. It is referred to as W-5 in the study.

by the results of studies on several 4-acre watersheds in another part of the station on which various methods of farming were used. Average peak rates of runoff after the July 10 storm were about 30 per cent less from both contoured and subsurface-tilled watersheds than from the straight-rowed fields, even though the average slope of the subsurface-tilled plots was steeper than that of the others. The peak rates of runoff from the 4-acre grassed watersheds were 70 per cent lower than from the straight-rowed cultivated plots.

Second, no conservation treatment had been applied on one farm located at the head of the partly protected watershed.

Third, information is lacking on the effect of watershed conservation measures on sediment production. This is important, because sedimentation is responsible for a large part of flood damage.

In spite of these deficiencies, however, the partly protected watershed gave evidence that conservation can have a material effect on runoff from watersheds and on the flow of smaller streams.

These results seem significant in view of the flood-damage problems that confront the country. They are actual measurements of the effects of partial conservation on the amounts and rates of runoff, compared with similar untreated watershed.

Wildlife and the Business of Farming

(*Continued from page* 226)

ness of this difficulty and this need now is widely evident. Large sportsmen's organizations have been promoting various systems of identification for their members and offering guarantees against offensive acts. State game departments are sponsoring campaigns urging the hunter to "Ask the farmer first." There are regulations in some states requiring written permission to hunt on posted land. These are steps in the right direction, but we still are far short of the ultimate need. If the public could get truly aroused over this and promote a system of heavy penalties and strict enforcement as a reward for trespass and vandalism, it probably would take only a few years to overcome the irresponsible attitude of a small minority of hunters who now are bringing farm-wildlife developments to a standstill in some areas. Until that comes about, we are likely to make little headway in applying wildlife management as a public program in regions of heavy population.

Looking broadly at the place of wildlife in the national economy, we can be fairly certain of several continuing trends:

As our national population grows, wildlife benefits of the esthetic and recreational type will become increasingly important as a part of our standard of living. Agricultural lands are in a key position to produce such benefits because (1) they are fertile and have high potential yield, and (2) they are accessible to large numbers of people.

We have not made the most of such values in the past; and if we are to do so in the future, it is essential that we improve our on-the-land methods of growing the wildlife crop and provide a better legal basis for getting game animals harvested. If sufficient effort would be brought to bear on these two points, it should not take many years to resolve our principal difficulties.

LITERATURE CITED

1. Anderson, Wallace L., Making land produce useful wildlife. U. S. Dept. Agr. Farmer's Bull. 2035:1-29, 1951.
2. Edminster, Frank C. and Richard M. May, Shrub plantings for soil conservation and wildlife cover in the Northeast. U. S. Dept. Agr. Circ. 887:1-68, 1951.
3. Gordon, Seth, What about the future of hunting and fishing in North America? Internat. Assoc., Game, Fish & Cons. Comm., 40th Ann. Conv., (mimeo) :1-15, 1950.
4. Rosene, Walter, Jr., Care and maintenance of bicolor lespedeza. Soil Cons. 17(7):151-153, 1952.

Book Reviews

PASTURES FOR RHODE ISLAND. *By* IRENE H. STUCKEY. *Rhode Island Agricultural Experiment Station Bulletin 313, May 1952.*

This pasture bulletin prepared by our "Pasture Lady" from Rhode Island shows step by step the development of improved pasture mixtures, and improved pasture management practices by intensive research.

Problems of establishment and management of different pastures and forage mixtures are discussed. The year by year performance of individual species being grown in mixtures is traced, and the reasons given for their success or failure. In the research program which led to the development of improved mixtures, and management systems, many different pasture plants were tried on various soil types. There were many failures, but finally several good mixtures were developed.

It is shown in this bulletin, how land that once required ten to twenty acres of pasture per cow can be converted into productive pasture that will require only two acres to supply the feed for one cow.

Pasture renovation and establishment problems are presented and methods are given for changing unproductive land to productive land.

This bulletin emphasizes pastures rather than hay crops or grass silage even though they are recognized as important in the production of feed.

Several of the superior pasture mixtures were evaluated under grazing. Different systems of management were observed in order to learn the best method of maintaining the legume stands.

Many of the principles of grassland agriculture shown in this bulletin should apply to much of the New England area.

—D. S. CHAMBLEE, Raleigh, N. C.

HIGHLIGHTS IN THE HISTORY OF FOREST CONSERVATION, UNITED STATES FOREST SERVICE. *U.S.D.A. Agr. Inf. Bul. No. 83. Aug. 1952. 23 pp. For sale by the Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 15 cents.*

Packed into a few pages is a lot of history on forest conservation. It is a chronology of important events beginning with "1626 when the Plymouth Colony passed an ordinance prohibiting cutting timber on Colony lands without official consent" to 1951 when the American Forestry Association published its survey of "progress in forestry." Some 76 "highlights" are briefly recorded. Seven periods are recognized which aid in focusing attention on time and events.

In reading this bulletin, one is reminded of the 60th Anniversary Number—September 1935—of *American Forests*, which can be used as a reference if the reading of this bulletin creates a desire for more knowledge on time, plans or events.

Pleasure as well as profit can come from reading this bulletin,—it's in no way technical. *It should find a place in our library reference file. It is particularly adapted to the use of teachers and students.*

The establishment of National Forests are highlights in the progress of forest conservation. These forests are named and dates of their establishment are given.

It is interesting to note that the anonymous authors included a "conclusion."

After reading the bulletin, one would agree with them that progress, typically American, toward greater fulfilment of the meaning of the word "conservation"—Wise Use—has and is occurring.

—A. C. MCINTYRE, Upper Darby, Penna.

INSECTS. *The Yearbook of Agriculture. 1951-1952. Edited by* ALFRED STEFFERUD. *United States Department of Agriculture, Washington, D. C. 1952. 952 pages. $2.50.*

The new yearbook entitled *"Insects"* is designed to be a practical aid to farmers and city people in identifying insects, making better use of the helpful ones, and controlling the pests that cause an estimated four billion dollars of damage each year.

An outstanding feature of the new yearbook is a section of 72 color plates of the important insects of the United States. The drawings depict the life stages of the insects and the damage they do. Opposite the drawings are descriptions and control recommendations. In addition, eight black-and-white photographs and more than 200 line drawings will help readers identify insects.

The yearbook begins with a general discussion about the number of insects, their history, how they live, what they eat. A key to insect identification and information about making collections follows. A chapter "Insects as Helpers" includes articles on pollination by honey bees and other insects, bee breeding, the effect of insecticides on bees, and weed control by insects. The destructive species are discussed in the next chapter—those that transmit diseases of plants, animals, and humans, as well as those that destroy crops and livestock by direct feeding.

Several chapters discuss insecticides and fumigants and their application. The hazards of pesticides, such as harmful residues and toxicity to livestock, make up one chapter; resistance of insects to insecticides is discussed in another.

The second half of the book is devoted to the major pests of people and their homes, cotton, vegetables, fruits, field crops, ornamentals, livestock, trees, and wild-

life. The articles describe the insects and their damage and tell how to control them.

IMPROVING THE WORLD'S GRASSLANDS. *FAO Agricultural Studies No. 16. By* ARTHUR T. SEMPLE. *147 pages, illustrated. 1951. The University Press, Aberdeen.*

From the opening chapter on the *"Importance of Grassland"* to the concluding one on *"The Need for Research,"* the author gives an illuminating account of the place grass holds in Agriculture and how, through proper management, it can be brought to yield more abundantly. The book is truly cosmopolitan in character and world wide in scope. Results, examples, illustrations and data are given from the major grasslands of the world.

Students of grassland Agriculture and Range Conservationists in particular, will recognize the treatment and application of fundamental principles of physiology, ecology and related sciences to the proper management of grasslands. An entire chapter is devoted to *"How Forage Plants Grow"* so the reader will understand the interdependence of shoot and root which affects the productiveness of the range. Other chapters deal with the management of livestock—the kind, stocking, fencing, rotation grazing, and the effects of species on pasture productivity.

Discussing *"Seeding and Fertilizing"* of abandoned cropland and rangeland attention is given to adequate sources of good seed as a prerequisite to many programs of grassland improvement, including testing, domestication and seed production of improved varieties. Fertilizing with manure, commercial fertilizers and trace elements has greatly increased forage production in humid and subhumid grasslands but not on native grass stands on the semi-arid lands of the Great Plains. Mechanical treatment and burning of grasslands, controversial subjects in this country, are well discussed giving experimental data showing benefits and dangers in the use of fire if not controlled; and mechanical treatment as an aid to recovery of depleted or abused rangelands. The use of chemicals (2, 4-D) and insects for controlling weed pests or for killing competing vegetation has materially increased the productivity of grasslands. Fodder from trees and shrubs used as browse although of minor importance in this country find considerable use in parts of the world for tiding livestock over critical periods when other forage is scarce. The importance of supplemental feed as hay and silage is emphasized where forage production ceases for a part of the year due to cold or drought, or where the amount is relatively high during one part of the season and greatly reduced in another part.

In the concluding chapter on *"The Need for Research"* the author quotes from J. W. Roland, (South Africa), on the inter-relationship between plants and animals in the work of soil building: "One of the objects is the production of a continuous flow of feed of a consistently high standard, without which animals cannot be satisfactorily produced. There follows the investigation of what proportion of plant growth the soil can afford to lose each year without suffering depletion. This proportion and no more (either in animal or plant form) should be available for sale off the farm. This is not animal production, nor is it crop production, but it is closely bound up with both. It is essentially soil conservation."

The 56 pages of well chosen photographs, with explanatory legends, help tell the story of improving world grasslands most effectively. This well-written book should be in every conservation library.

—A. D. STOESZ, *Lincoln, Nebraska*

AGRICULTURAL HYDROLOGY AS EVALUATED BY MONOLITH LYSIMETERS. *By* L. L. HAROLD, *Project Supervisor and* F. R. DREIBELBIS, *Soil Scientist, Technical Bulletin No. 1050, December 1951, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 149 pages. $0.45.*

Technical Bulletin No. 1050 presents a detailed, comprehensive study of the basic factors governing agricultural hydrology, based on 12 years of lysimeter operation at the North Appalachian Experimental Watershed, at Coshocton, Ohio. Many of the factors involved are interrelated and dependent on one another, necessitating a complex experimental procedure and analysis. "A knowledge of water movement on the land surface, movement into and through the soil, condensation and absorption of water, evaporation, and use of water by crops is necessary for a comprehensive approach to water control."

This bulletin contains numerous tables, charts, and detailed explanations which bring out the thorough consideration given all factors which may affect the results. Because of this, it will be useful principally to those interested in the quantitative aspects of soil and water science.

The monolith lysimeter is a casing of vertical walls built around a block of soil in place. Perforated pans are inserted beneath the soil block to collect percolation water. Three batteries of monolith lysimeters were installed in areas representative of different watershed conditions. The unique feature of the lysimeter set-up was the installation of an automatic weight recording mechanism under one lysimeter in each battery, which made possible the measurement of evapo-transpiration and condensation-absorption. The scale frame carried the entire load of about 65 tons and dead weight below the expected range in weight variance was eliminated by

counterbalances. After installation, the scales were tested over a 20,000-pound range and the mechanism was found to measure weight changes to the nearest 5 pounds, which is slightly more than the weight of 0.01 inch of water on the lysimeter area.

Automatic recording devices registered percolation, runoff, precipitation, temperature of soil and air at different levels, atmospheric moisture, evaporation from BPI pans, barometric pressure, sunshine duration, wind movement, and weight increases or losses of soil moisture within the lysimeters on scales. Soil moisture observations were made in areas adjacent to the lysimeters periodically and chemical analysis were made of the percolates.

Cultural treatments on the lysimeters were designed to provide measurements needed to evaluate the hydrology of permanent grasses and legumes on well-drained soil, a crop rotation of corn, wheat and 2 years of meadow on well drained soil, and a similar rotation on slowly permeable soil. Agricultural operations were carried on at the same time and at the same intensity as in adjacent fields. However, ti was necessary to use hand tools in working the lysimeter soil.

The bulletin contains a critical discussion of the limitations of lysimeters. Grazing of the grass covered lysimeters was impractical and therefore the effect of stock trampling on the soil surface could not be obtained. The working of the lysimeter soils with hand tools did not produce the soil compaction obtained with today's mechanized farm equipment. Also, runoff from upperlying areas was diverted around the lysimeter and therefore the concentration and development of surface flow on the lysimeters were not representative of natural field flows.

Condensation-absorption was found to contribute amounts ranging from 6 to 9 inches of water annually. During periods of no precipitation, well-defined weight increases were attributed to condensation-absorption. A study was also made of the effect on evapo-transpiration of dew or rain water on the vegetation or soil by comparing the evapo-transpiration values for wet plants and soil surfaces with those from dry surfaces. The general conclusion of the study was that moisture on vegetation from the preceding night, whether from rain or dew, had no noticeable effect on evapo-transpiration. Evapotranspiration was no greater from wet vegetation than from dry, but the water was taken from below ground in the latter case.

Throughout the months of May, June, July and August, on cropped fields, the soil moisture was generally being depleted faster than it was accumulated, unless precipitation was abnormally high. This demonstrates that soils must be kept in condition capable of storing enough soil moisture to carry the crops through this period of high depletion and limited accretion of soil moisture.

In these days of sweeping qualitative statements on quantitative problems, it is heartening to have the opportunity to study so sound and workmanlike a publication. It will be a classic reference source. Factual information and informed analysis such as Mr. Harrold and Mr. Dreibelbis have made available are of the utmost value to all who seek to understand and advance soil and water conservation.

—KARL R. KLINGELHOFER, *Urbana, Illinois*

Waterfowl and Their Plants in Washington. *By* CHARLES F. YOCUM. *The University of Washington Press; Seattle. 272 pages. 1951. $5.00.*

This book, as the title suggests, is local in coverage. It contains a considerable amount of information about the waterfowl, climate and aquatic plants of Washington, as well as data on food habits of waterfowl.

Economic Aspects of Wildlife Resources in the State of Washington, *Economic & Business Studies, Bulletin 19. By* ROBERT F. WALLACE. *The State College of Washington Press, Pullman, Washington. 1951.*

Based on one of the most scientific studies of the kind ever made, the author provides striking confirmation of the economic importance of wildlife resources for those who demand an appraisal in dollars and cents. The published booklet is recommended reading for all wildlife administrators, technicians and lay conservationists. A study of the methods used in this survey is a must for any other individual or state agency contemplating a similar study.

Shrub Plantings for Soil Conservation and Wildlife Cover in the Northeast. *Circular No. 887. By* FRANK C. EDMINISTER *and* RICHARD M. MAY. *U. S. Department of Agriculture, Washington, D. C. 1951. 68 pages. 30 cents.*

Making Land Produce Useful Wildlife. *By* WALLACE L. ANDERSON. *Farmers' Bulletin No. 2035, U. S. Department of Agriculture, Washington, D. C. 1951. 30 pages. 15 cents.*

Serecia in Conservation Farming. *By* R. Y. BAILEY. *Farmers' Bulletin No. 2033, U. S. Department of Agriculture, Washington, D. C. 1951. 30 pages. 15 cents.*

An Outline for Teaching Conservation in High Schools. *U. S. Department of Agriculture, Soil Conservation Service, Washington, D. C. PA-201. 1952. 21 pages.*

Trees and Bank Accounts: *A Forestry Manual for Banks.* AGRICULTURAL COMMISSION, *American Bankers Association, 21 East 36th Street, New York 16. 1952. 24 pages. 25 cents.*

The Role of Conservation on the Education Program of Latin America. *By* ANNETTE L. FLUGGER. *Pan American Union, Washington, D. C. 1951. 56 pages.*

The Wealth of the Soil. *By* LOUIS BROMFIELD. *Harry Ferguson, Inc., Detroit, Michigan. 1952. 32 pages. Illustrated.*

FIELD NOTES AND COMMENTS

Research Responsibilities Realined in USDA

Secretary of Agriculture Charles F. Brannan recently announced the realignment of USDA responsibilities in the fields of soil surveys and soil, crop and water management research. Responsibility to conduct the National Cooperative Soil Survey, which has been the responsibility of the Agriculture Research Administration, has been assigned to the Soil Conservation Service, and responsibility for all research in soil and crop management and in water management on farms related to crop production has been assigned to the ARA, including that previously carried on by the SCS.

This realignment of responsibilities will be effective as of November 15, 1952. The purpose of this action is to consolidate into one operation the soil survey work of the ARA and the conservation survey work of the SCS, and to focus more sharply all resources for soil, crop and water management research on the various problems that confront farmers throughout the country.

This action establishes one comprehensive technically sound national soil survey that will fill all the needs of the SCS program and meet all the soil survey requirements of other agencies.

Point Four Positions Open

The Department of Agriculture is currently recruiting a number of agriculturists for appointments under the Point Four Program. Such positions are open to qualified agriculturists without taking Civil Service examinations. If an applicant wishes to get his name on the Recruitment Roster, he may do so by filing a completed Form 57, Application for Federal Employment, with the Division of Employment, Office of Personnel, U. S. Department of Agriculture, Washington 25, D. C.

Positions are available for Agricultural Engineers, Livestock and Animal Husbandry Specialists, Machinery Operators and Maintenance Men, Agronomists, Cotton Specialists, Horticulturists, Extension Specialists, Range Revegetation Specialists, Plant Pathologists, Harvesting and Marketing Specialists, Soil Scientists, Cooperative Specialists, Rice and Poultry Specialists, Bio-chemists, and Entomologists.

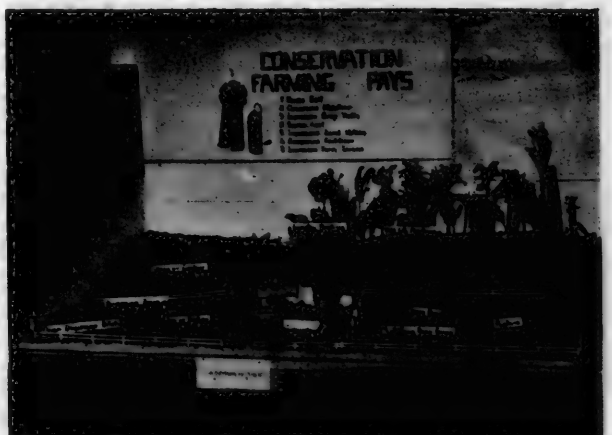
A Community Approach to Soil Conservation

In the Odell and Rankin, Illinois, communities, a study of *"A Community Approach to Soil Conservation"* is evaluating the influence of existing social institutions and leaders in a community and the effect of different methods of conservation education upon the acceptance and use of soil conservation measures. This study shows that the extent to which farmers accept or reject certain recommended practices is related to a number of socio-cultural factors, such as beliefs, attitudes, traditions, customs, and a general reluctance to change or accept new ideas. The role and the effectiveness of existing formal and informal groups and local institutions and agencies—churches, schools, clubs, lodges, businesses, etc.—in promoting community-wide interest and action in soil conservation among farmers and landowners is being studied. Results to date in the two communities under study indicate that these local groups and agencies may be a potent influence in getting more conservation on the land.

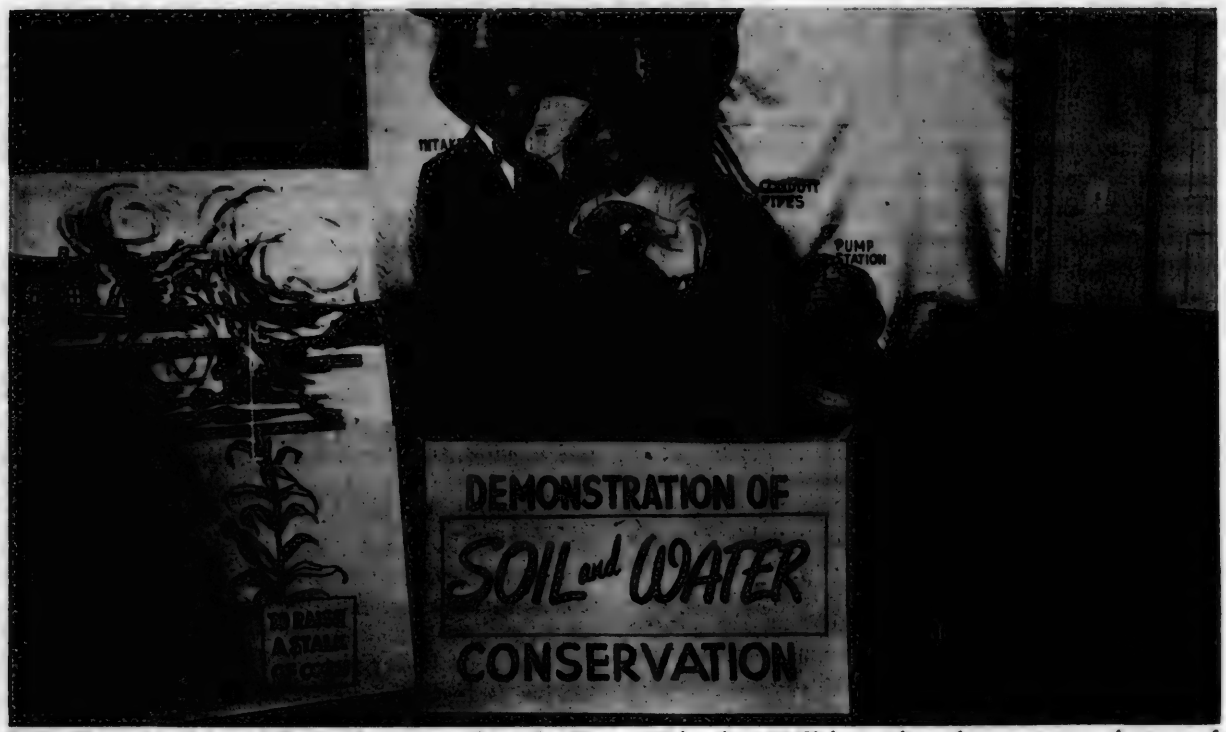
4-H Conservation Exhibits at Maryland State Fair

Sixteen booths on Conservation were exhibited at the Maryland State Fair under three general headings: *Conservation of Human Resources, Economic Resources,* and *Soil and Water Resources.* The champion booth was one under the heading of Soil and Water Conservation and exhibited by the Potomac 4-H Club of Montgomery County. By using loose soil, the topography of a miniature farm was shaped and the necessary conservation practices were then demonstrated. This exhibit was chosen as the champion because of the accuracy and clearness of presentation. As will be noticed in the picture, the signs are clear and legible and easily understood.

This booth, along with all the others, showed that a great amount of work and planning had gone into them. The Potomac Club was the winner of the $40.00 prize for the best exhibit in the show.



This conservation booth exhibited by the Potomac 4-H Club of Montgomery County won the champion prize at the Maryland State Fair at Timonium.



Rollin Shoemaker, left, and Pauline Lunka, members of a Denver, Colorado, 4-H Club, are shown here presenting the story of soil and water conservation through the use of visual aids. The case for a loud speaker, fan for blowing soil across the room are shown at the extreme upper left. The painted display at left shows what high winds do to denuded soil, how much water is needed for crops. The young people are holding a test tube to demonstrate how impurities are filtered through soil, while a "wash board" at right tells the story of contour cultivation.

Demonstration on Soil and Water Conservation

Conservationists everywhere are constantly on the alert for new materials, new methods to help tell the story of developing and conserving both soil and water resources.

From out Denver way comes the report of a novel, and altogether impressive, demonstration of soil and water conservation methods. The demonstration was done by two selected 4-H club members, Pauline Lunka and Rollin Shoemaker. They worked as a team and, with a number of visual aides, developed their story through the medium of a very simple thing—a glass of pure, sparkling water.

Through the medium of the glass of water they unfolded the connected chain of events from the falling raindrop to the shocking losses in topsoil, crops and money arising from lack of control measures.

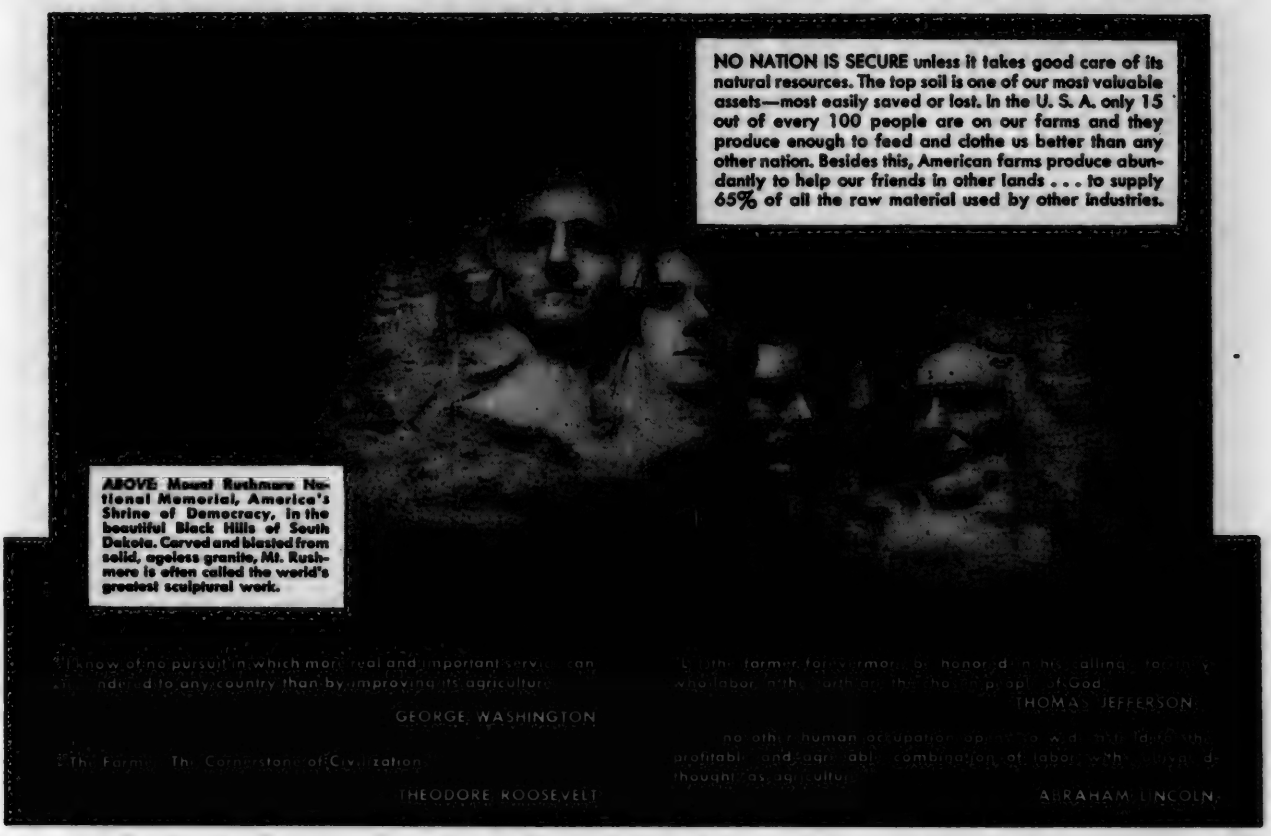
In the course of following the raindrops, the demonstrators adopted a pattern of conversation which permitted them to bring before their listeners a variety of *"home-made"* devices. For example:

Two gallon jugs told the story of (1) raw water which was carrying a heavy load of silt and (2) water from the same source which had undergone settling (out) and was clear and usable for human consumption; A small filtering plant arranged as a test tube affair, with the larger tube holding gravel and fine sand, demonstrating methods of filtration; A divided pan, one side showing grass land, the other denuded soil, both used to drive home the point of proper cover for soil to prevent wind erosion and conserve rainfall; A vacuum sweeper with blower operating across two similar pans, the one containing soil in the form of dust, the other soil with grass cover, and a large board with horizontally-running ridges and grooves to show how contour cultivation aids in holding back runoff of water and consequent loss of soil. A commercial washboard will serve the same purpose, using it vertically to represent contour practices, on its side to permit rapid runoff experienced in "up and down slope" farming.

The accompanying photograph shows most of the materials used and the two young people who did such an excellent job. Robert D. Buck is the local 4-H agent who worked with them.

That Colorado is conservation conscious is shown in the fact that the state has 95 soil conservation districts out of approximately 2,400 the nation over.

These four Farmer-Statesmen found the "Roots of Freedom" in the soil!


NO NATION IS SECURE unless it takes good care of its natural resources. The top soil is one of our most valuable assets—most easily saved or lost. In the U. S. A. only 15 out of every 100 people are on our farms and they produce enough to feed and clothe us better than any other nation. Besides this, American farms produce abundantly to help our friends in other lands . . . to supply 65% of all the raw material used by other industries.
ABOVE: Mount Rushmore National Memorial, America's Shrine of Democracy, in the beautiful Black Hills of South Dakota. Carved and blasted from solid, ageless granite, Mt. Rushmore is often called the world's greatest sculptural work.
GEORGE WASHINGTON
THEODORE ROOSEVELT
THOMAS JEFFERSON
ABRAHAM LINCOLN

You can help preserve that freedom through sound soil conservation

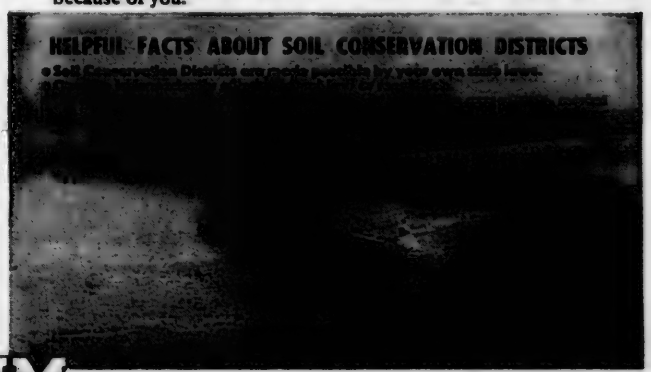
Your freedom . . . America's freedom . . . is rooted in the topsoil!

Washington knew this when he spoke out for soil conservation. Jefferson, Roosevelt and Lincoln knew it when they spoke for agriculture. Because they were farmers themselves, all four knew that hunger and poverty breed war and strife . . . that food and the products of the farm are powerful weapons for peace and freedom. They knew, too, that America's agriculture and the enterprising American farmer were, and are, keys to American greatness . . . that the industry of the soil was, after all, the basic industry of any nation.

Today, those things . . . the peace and freedom that hinge on farm production . . . are in the hands of you, the American farmer. *That* is why *soil conservation* is important both to you and to America.

Year after year more of America's future washes away—needlessly. Is anything being done about it? Yes, thousands of modern farmers like yourself are seeing the need for sound conservation practices and *are* attacking the problem. Typical are the farmers who have organized and manage 2300 non-political Soil Conservation Districts. Sure, it has cost them some money as an original investment. But ask a soil conservation man and he'll tell you that his land pays him many times over what he puts into it. Increased production pays back the principal plus increased yields. Then too, the generations of the future who will continue to live by the land, will benefit as even you do.

If you are interested in the program of Soil Conservation Districts, see your MM dealer today or write to the United States Department of Agriculture, Washington, D. C. Ask for complete information on establishing a soil conservation district in your neighborhood. You too, will find that the "Roots of Freedom" are in the topsoil . . . and they will be stronger because of you.



MM MODERN MACHINERY

MINNEAPOLIS-MOLINE

MINNEAPOLIS 1, MINNESOTA

MANUFACTURERS OF THE COMPLETE LINE OF MODERN VISIONLINED TRACTORS, FARM MACHINERY AND POWER UNITS FOR AGRICULTURE

At Last —

A Glossary of Soil and Water Conservation Terms Published by the Soil Conservation Society of America

Here is an indispensable tool for every conservationist and organization concerned with resource conservation.

The Glossary was developed by a special committee representing all phases of resource use and conservation. It first appeared in regular issues of the *Journal* and is now available in booklet form.

In This Glossary you will find—

1. **Words and terms which specifically apply or are clearly related to land use, soil and water conservation.**
2. **Scientific terms which the average conservationist needs to know or is likely to find in soil and water conservation literature.**
3. **Words and terms defined only in their application to land use, soil and water conservation.**

Professional workers in soil and water conservation and related fields will want copies for reference purposes; also students of agriculture, agricultural libraries of high schools, colleges and industries. Vocational Agriculture Instructors, County Agents, Extension Specialists, members of soils departments, experiment stations and college instructors will find the Soil and Water Conservation Glossary useful.

Soil Conservation Society of America
Suite 1016 Paramount Building
Des Moines, Iowa

Please send me _____ copies of the SOIL AND WATER CONSERVATION GLOSSARY, at $1.00 per copy.

Name_____

Address_____

City_____ Zone_____ State_____

37 pages **8½ x 11 inches in size**
Order Now ***Price $1.00***

Conservation Farming Reduces Reservoir Siltation

Land use and soil treatment data, and costs and benefits of a conservation program, were studied for the watersheds of Carbondale and West Frankfort, Illinois, reservoirs and Lake Bracken, Galesburg, and Ridge Lake, Charleston, Illinois.

In the reservoirs and lakes studied, land use practices that were too intensive for the capabilities of the land in the watershed contributed materially to siltation. Inadequate soil fertility treatment, resulting in poor stands and growth of legumes and grasses, also increased siltation. Adoption of soil conseravtion programs by farmers in the watersheds would reduce the volume of sediment draining into the reservoirs. The farmer himself would also benefit through an increase in crop and livestock production and a resulting increase in net farm income.

—E. L. SAUER, Project Supervisor
University of Illinois and U. S.
Soil Conservation Research

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (39 U.S.C. 233)

Of JOURNAL OF SOIL AND WATER CONSERVATION, published quarterly at Baltimore, Maryland, for October, 1952.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, Soil Conservation Society of America, 3110 Elm Ave., Baltimore 11 Md.
Editor, Walter C. Gumbel, Watson Bldg., Fairmont, W. Va.
Business Manager, H. Wayne Pritchard, Des Moines, Iowa.

2. The owner is: (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as those of each individual member, must be given.)
Soil Conservation Society of America, Inc. (no stock issued).

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds mortgages, or other securities are: None.

4. The two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

BEVERLEY RHETT, *Publisher.*

Sworn to and subscribed before me this 10th day of September, 1952.
LORETTA NEUBERGER
(My commission expires 5/4/53)

Living ribbons—THAT KEEP SOIL AT HOME

There's nothing spectacular about the waterway in this oats stubble field. It's just a few feet wide and only about 40 rods long—a narrow ribbon in a gently sloping field.

And yet this tiny strip of land is playing an important role in the soil conservation program on Glen Quam's quarter-section in southern Wisconsin. It slows down runoff water, prevents soil-robbing gullies from getting started, keeps fertile topsoil from being washed away—keeps it at home, where it belongs.

The job of maintaining this waterway—of keeping it the right width and contour for maximum water control—is a simple, practical one with the help of *regular* McCormick farm equipment. Here, with a Farmall Super M tractor and a McCormick 3-bottom moldboard plow, equipped with Remote-Control, Glen Quam of Dane County, Wis., lifts the plow bottoms surely, quickly, to keep waterway edges even and straight.

International Harvester designers, engineers, product specialists and dealers are constantly striving to find better ways to make *regular* McCormick farm equipment *more useful* in carrying out recommended soil conservation practices. They know that whatever helps promote *better land use* helps make a stronger America.

INTERNATIONAL HARVESTER

International Harvester products pay for themselves in use—McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Crawler Tractors and Power Units . . . Refrigerators and Freezers—General Office, Chicago 1, Illinois

In the interest of America and its Agriculture —

Goodyear's Soil Conservation Awards Program

is now under way for the sixth straight year

Man has no greater heritage than topsoil and water. To help protect this heritage in America—to stimulate the efforts of volunteer soil conservation workers, and farm and ranch operators in conserving these essential resources — The Goodyear Tire & Rubber Company, Inc., is honored and happy to sponsor again another series of competitive awards for the Governing Bodies of Soil Conservation Districts and participating farmers.

The sixth in this consecutive series of awards programs sponsored by Goodyear began July 1st, and will continue through June 30th, 1953. Winners of top honors will receive seven-day, all-expense-paid vacations at Goodyear Farms in Litchfield Park, Arizona.

Commemorative bronze plaques and Certificates of Merit will be awarded at luncheon celebrations in a centrally located city in each state in which the program is conducted.*

The winners' prizes, however, are merely tokens. The greatest reward is the priceless satisfaction each participant gains in knowing that every forward step taken in Soil Conservation is a forward step in continuing the prosperity of America and its Agriculture.

***PARTICIPATING STATES**

For four years, Goodyear conducted its Soil Conservation Awards Program in the lake and corn belt states. In 1951, this program was moved to Louisiana, Arkansas, Oklahoma, Nebraska, Kansas, Wyoming, Montana and North and South Dakota, in which states the program is being conducted again this year.

We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network

GOODYEAR

THE GREATEST NAME IN RUBBER